CAST
CENTER FOR THE ADVANCEMENT OF SCIENCE AND TECHNOLOGY
CATALOG
OCTOBER 2013
• AGRICULTURAL BUSINESS TECHNOLOGY
• ALTERNATIVE ENERGY
• ASTRONOMY
• ENERGY EFFICIENCY
• GEOGRAPHIC INFORMATION SYSTEMS
• METEOROLOGY
• OCEANOGRAPHY
• PHYSICAL SCIENCE
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BURLINGTON COUNTY COLLEGE
CENTER FOR THE ADVANCEMENT OF SCIENCE AND TECHNOLOGY

Equipment Catalog

INFRASTRUCTURE & CAPABILITIES

October 2013

Purpose

This inventory was developed by Burlington County College in order to document equipment and corresponding curriculum that was purchased under the auspices of a generous science education and research grant provided by NASA. Additional capabilities were funded by a grant from the New Jersey Department of Environmental Protection. The goals of this document include, but are not limited to the following:

- Create a general reference resource for faculty and staff detailing new equipment available for integration into current course offerings.
- Provide documentation that allows Science, Math, and Technology program faculty and staff to have an understanding of the equipment that is available when developing new curriculum in the field of Sustainability and Alternative Energy Technology as well as other academic areas.
- Provide current and prospective students with information about state-of-the-art equipment that is available at Burlington County College.

This catalog is available online at:

bcc.edu/castcatalog

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1. Astronomy

1.1. Meade 8” LX90 GPS Schmidt Cassegrain w/ UHTC Coatings

	CATEGORY: Astronomy
	MANUFACTURER: Meade
	MODEL: LX90GPS
MANUFACTURER PRODUCT PAGE: Meade 8” GPS Schmidt-Cassegrain reflecting telescope w/ UHTC	
Comments:	

Current Class Utilization		
Subject:	Course Number:	
PHY	120	Introduction to Astronomy
PHY	121	Introduction to Astronomy Lab
PSC	110	Project Universe-Introduction to Astronomy

DESCRIPTION: The LX90GPS can track and talk to satellites. The built-in Sony GPS sensor immediately determines the precise date, time and location. The AutoAlign uses the info to align the scope for a tour of sights in the universe.

CAPABILITIES:

AUTOALIGN – AutoAlign picks two fail-proof alignment stars and places them right in the viewfinder.

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OVERSIZED PRIMARY MIRROR – the diameter of the 8" LX90's primary mirror is 8.25".

SLEW SPEED – The LX90GPS slews (moves) from star to star at 7 degrees per second.

SMART DRIVE – Will minimize guiding corrections during long exposure astrophotography.

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1.2. Coronado Solarmax 90 w/ 30mm BF & Sol Ranger

.

	CATEGORY: **Astronomy**
	MANUFACTURER: **Coranado**
	MODEL: **SM90T30**
MANUFACTURER PRODUCT PAGE: **Solarmax 90 telescope w/ 30mm blocking filter & Sol Ranger**	
Comments:	

Current Class Utilization		
Subject:	Course Number:	
PHY	120	Introduction to Astronomy
PHY	121	Introduction to Astronomy Lab
PSC	110	Project Universe-Introduction to Astronomy

CAPABILITIES:

- Aperture: 90mm
- Focal Length: 800mm
- F/Ratio: F/8.8
- Bandwidth: <0.7Å
- Thermal Stability: 0.005 Å/°C
- Safety Blocking: $>10^{-5}$ from EUV/IR

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1.3. Meade 12” Advanced Ritchey-Chretien Reflector w/UHTC

	CATEGORY: **Astronomy**
	MANUFACTURER: **Meade**
	MODEL: **RCX400**
MANUFACTURER PRODUCT PAGE: **Meade 12” Advanced Ritchey-Chretien w/ UHTC**	
Comments:	

Current Class Utilization		
Subject:	Course Number:	
PHY	120	Introduction to Astronomy
PHY	121	Introduction to Astronomy Lab
PSC	110	Project Universe-Introduction to Astronomy

DESCRIPTION: A fast (f/8) RC design produces a large, coma-free field of view from edge-to-edge. Visual observers can view pinpoint stars and extended objects across the larger field of view. This combines a hyperbolic secondary mirror with a corrector-lens-and-spherical-primary-mirror combination that performs as one hyperbolic element. This design produces a coma-free, flat field of view eliminates diffraction spikes and improves astigmatism.

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1.4. Celestron FirstScope 70mm Equatorial Refractor

.

	CATEGORY: **Astronomy**
	MANUFACTURER: **Celestron**
	MODEL: **FS70EQ**
MANUFACTURER PRODUCT PAGE: **Celestron FirstScope 70mm Equatorial refractor telescope**	
Comments:	

Current Class Utilization		
Subject:	Course Number:	
PHY	120	Introduction to Astronomy
PHY	121	Introduction to Astronomy Lab
PSC	110	Project Universe-Introduction to Astronomy

DESCRIPTION: FirstScope 70 models are powerful optical instruments that have 100 times the light gathering ability of the naked eye. This ability allows the FirstScope 70 to deliver images 37% brighter than those produced by a 60mm refractor telescope. The objective lens is designed to yield the finest images available in this class of optical instrument. These telescopes have all glass components, coated optics and smooth functioning mounts, with slow motion controls on the mount for easy adjustments. The FirstScope 70 telescope tubes are glossy black aluminum.

CAPABILITIES:
OPTICAL DESIGN: Refractor
APERTURE 70 mm: (2.76 in)
FOCAL LENGTH: 900 mm (35.43 in)
FOCAL RATIO: 12.86
TELESCOPE WEIGHT: 17 lb (7.71 kg)

1.5. Celestron Telescope Accessory Kit 1.25”

	CATEGORY: **Astronomy**
	MANUFACTURER: **Celestron**
	MODEL:
MANUFACTURER PRODUCT PAGE: **Celestron Telescope Accessory Kit 1.25”**	
Comments:	

Current Class Utilization		
Subject:	Course Number:	
PHY	120	Introduction to Astronomy
PHY	121	Introduction to Astronomy Lab
PSC	110	Project Universe-Introduction to Astronomy

CAPABILITIES:

The Eyepiece and Filter Kit (#94303) contains:

• Five Superior Grade Plössl Eyepieces - 1.25” — 4-element design with a 52° AFOV (32mm has 44°) — Superb color resolution, edge sharpness and clarity. All eyepieces are fully multi-coated for maximum contrast and resolution. Supplied are a 4mm, 6mm, 9mm, 15mm, and 32mm.

• Barlow Lens - 2x 1.25”— Compliments the Plössl eyepieces in this kit and gives a total of ten power combinations. High grade glass optics with fully multicoated lenses are used so there is no degradation of image.

• Six Colored Eyepiece(Lunar & Planetary) Filters - 1.25” — Included are Kodak Wratten #12, #21, #25, #56, #58A, and #80A.

• Moon Filter - 1.25” — A neutral density filter which allows maximum enjoyment of the moon especially during the brighter phases.

• Aluminum Carrying Case — This sturdy and well-built case fits all of the above items in the die-cut foam interior and has room for additional accessories.

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1.6. Takahashi FSQ-106 Fluorite Refractor w/EM-11 USD III Mount

	CATEGORY: **Astronomy**
	MANUFACTURER: **Takahashi**
	MODEL: **FSQ106**
MANUFACTURER PRODUCT PAGE:	
Comments:	

Current Class Utilization		
Subject:	Course Number:	
PHY	120	Introduction to Astronomy
PHY	121	Introduction to Astronomy Lab
PSC	110	Project Universe-Introduction to Astronomy

DESCRIPTION: Takahashi's modified Petzval design employs two widely separated rear elements to correct field curvature and astigmatism to produce a flat field, high contrast image without any hint of lateral color. This design produces an 88mm image circle that will fully illuminate a 35, 645, or 6x7 medium format camera and vacuum back roll film holders. The 4" apo refractor, has a built-in camera angle adjuster that permits 360° rotation of the camera, making the FSQ-106 the perfect astrograph. This instrument can be used with a 4x5 vacuum back camera. The large image circle will permit the use of any CCD camera. The double fluorite design which forms an image free of any secondary color will produce exceptionally sharp, high contrast views of deep sky objects or total eclipses.

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*1.7. Zhumell Tachyon 25*100 Astronomical Binoculars*

	CATEGORY: **Astronomy**
	MANUFACTURER: **Zhumell**
	MODEL: **Tachyon**
MANUFACTURER PRODUCT PAGE: **Zhumell Tachyon 25x100 Astronomical Binocular w/ Locking Aluminum Case**	
Comments:	

Current Class Utilization		
Subject:	Course Number:	
PHY	120	Introduction to Astronomy
PHY	121	Introduction to Astronomy Lab
PSC	110	Project Universe-Introduction to Astronomy

DESCRIPTION: 25X magnification, 100mm objective lenses and built-in tripod adapter. High-performance features include: Fully multi-coated lenses; BaK4 prisms for excellent light transmission; Individual focus for precise adjustment; Rugged metal construction; Waterproof and nitrogen-purged. Ruggedly constructed and waterproof.

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1.8. Zhumell Professional Tripod

	CATEGORY: **Astronomy**
	MANUFACTURER: **Zhumell**
	MODEL: **Pro-Tripod**
MANUFACTURER PRODUCT PAGE: **Zhumell Professional Tripod**	
Comments:	

Current Class Utilization		
Subject:	Course Number:	
PHY	120	Introduction to Astronomy
PHY	121	Introduction to Astronomy Lab
PSC	110	Project Universe-Introduction to Astronomy

DESCRIPTION: High-performance features two included quick-release mounting plates allow camera switching almost instantly; Rubber feet with retractable spikes to enhance stability outdoors; Circular level to provide an even base from which to shoot.

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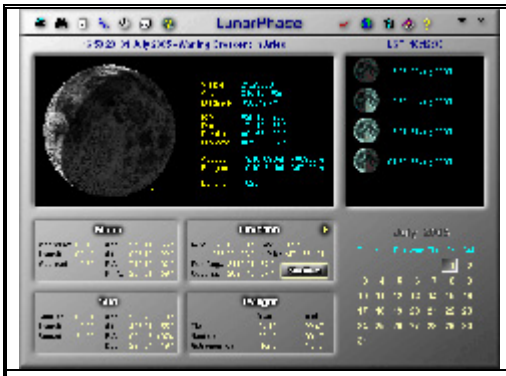
1.9. LunarPhase Professional Software

	CATEGORY: **Astronomy**
	MANUFACTURER: **LunarPhase**
	MODEL: **LunarPhase Pro v3**
MANUFACTURER PRODUCT PAGE: **LunarPhase Professional Moon Software**	
Comments:	

Current Class Utilization		
Subject:	Course Number:	
PHY	120	Introduction to Astronomy
PHY	121	Introduction to Astronomy Lab
PSC	105	Introduction to Physical Science
PSC	106	Introduction to Physical Science Lab
PSC	110	Project Universe – Introduction to Astronomy

DESCRIPTION: It produces a calendar of Moon Phases. By using the integrated observation planning tools and the general lunar data presented on screen, you'll be able to easily plan for an observing session and be productive while observing.

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2. Geographic Information Systems

2.1. Trimble Ranger Handheld

	CATEGORY: **Geographic Information Sys.**
	MANUFACTURER: **Trimble**
	MODEL: **Ranger**
MANUFACTURER PRODUCT PAGE: **Trimble Ranger Handheld**	
Comments:	

Current Class Utilization		
Subject:	Course Number:	
GEO	102	Principles of Geography
GIS	101	Fundamentals of Geographic Information Systems
GIS	201	Advanced Applications in Geographic Info Systems
GIS	202	Fundamentals of Remote Sensing
GIS	203	Fundamentals of Global Positioning Systems
GIS	291,292,293	Geospatial Technology Projects/Internship

DESCRIPTION: Built-in Bluetooth® allows cable-free connection to other Bluetooth devices, including Trimble's GPS Pathfinder® series receivers, for on-the-spot positioning. With integrated wireless LAN capability, the Trimble Ranger handheld can connect seamlessly to a local network for easy and convenient data transfer.

CAPABILITIES:
Microsoft Windows Mobile version 5.0 software maximizes your choice of software
Built-in Bluetooth and wireless LAN for cable-free connectivity
Full alphanumeric keypad for efficient data entry
Ultra-rugged design enables you to keep working in all conditions
Expandable and versatile, with two CF slots, one SDIO slot and a USB host port
TrimPix technology for wireless camera support

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2.2. Trimble Pathfinder ProXH

	CATEGORY: **Geographic Information Sys.**
	MANUFACTURER: **Trimble**
	MODEL: **Pathfinder ProXH**
MANUFACTURER PRODUCT PAGE: **Trimble Pathfinder ProXH**	
Comments:	

Current Class Utilization		
Subject:	Course Number:	
GEO	102	Principles of Geography
GIS	101	Fundamentals of Geographic Information Systems
GIS	201	Advanced Applications in Geographic Info Systems
GIS	202	Fundamentals of Remote Sensing
GIS	203	Fundamentals of Global Positioning Systems
GIS	291,292,293	Geospatial Technology Projects/Internship

DESCRIPTION: A GPS receiver, antenna, and all-day battery in one, the ProXH receiver delivers sub-foot (30 cm) accuracy with Trimble's revolutionary H-Star™ technology.

CAPABILITIES:
H-Star technology for sub-foot (30 cm) post-processed accuracy
Optional Zephyr antenna for 8-inch (20 cm) post-processed accuracy
Receiver, antenna, and battery in one compact unit
Bluetooth wireless technology for convenient cable-free operation
Rugged and weatherproof for all conditions
User-replaceable battery that lasts all day
Choice of field device and field software to suit your workflow

2.3. Trimble GeoXH Handheld

	CATEGORY: **Geographic Information Sys.**
	MANUFACTURER: **Trimble**
	MODEL: **GeoXH**
MANUFACTURER PRODUCT PAGE: **Trimble GeoXT Handheld**	
Comments:	

Current Class Utilization		
Subject:	Course Number:	
GEO	102	Principles of Geography
GIS	101	Fundamentals of Geographic Information Systems
GIS	201	Advanced Applications in Geographic Info Systems
GIS	202	Fundamentals of Remote Sensing
GIS	203	Fundamentals of Global Positioning Systems
GIS	291,292,293	Geospatial Technology Projects/Internship

DESCRIPTION: The GeoXH handheld delivers the sub-foot (30 cm) GPS accuracy required by electric and gas utilities, water and wastewater services, land reform projects, and other applications where accurate positioning is crucial.
The GeoXH handheld logs the data you need to achieve sub-foot accuracy.
The GeoXH handheld comes with a powerful 416 MHz processor.
There's plenty of storage space for all your GIS data, and with a Secure Digital (SD) memory card slot, you can add gigabytes of memory for all your maps.

CAPABILITIES:
H-Star technology for sub-foot post-processed GPS accuracy.
Microsoft Windows Mobile version 5.0 software, allowing maximum flexibility in software choice.
512 MB onboard memory plus removable SD memory.
Bluetooth and wireless LAN connectivity options.
Rugged handheld with all-day battery.
TrimPix technology for wireless camera support.

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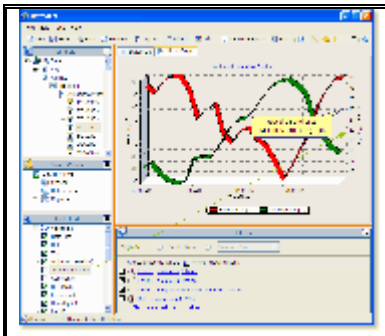
2.4. DataSight Natural Resource Data Platform

	CATEGORY: **Geographic Information Sys.**
	MANUFACTURER: **Seveno**
	MODEL: **DataSight**
MANUFACTURER PRODUCT PAGE: **DataSight Natural resource data platform**	
Comments:	

Current Class Utilization		
Subject:	Course Number:	
GEO	102	Principles of Geography
GIS	101	Fundamentals of Geographic Information Systems
GIS	201	Advanced Applications in Geographic Info Systems
GIS	202	Fundamentals of Remote Sensing
GIS	203	Fundamentals of Global Positioning Systems
GIS	291,292,293	Geospatial Technology Projects/Internship

DESCRIPTION: The advanced power of DataSight Desktop connects with or imports data from acquisition systems such as probes, sensors, data loggers and laboratory instrumentation into a logical centrally organized relational database. Legacy databases, spreadsheets, and existing data files can all be consolidated.

DataSight Desktop has built in functionality to track audit trails, perform data validation, data interrogation and graphical profiling.

Share and merge data from different DataSight databases as well as communicate with external databases such as the EPA's STORET. Data can then be shared, communicated, reported and published in a variety of formats including web-based.

DataSight Desktop is GIS and ODBC compliant adding its own power to your GIS environment and preserving your investment in existing applications. DataSight Desktop is also structured to accept plug-in analysis modules.

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CAPABILITIES:

Graphical Profiling
Users can drag and drop data variables onto graph axes to profile data. An unlimited number of series can be plotted against any independent axis and users have full control over presentation formats.

Audit Trails
DataSight's audit tracking function keeps track of individual personnel and devices involved in the data collection process. It includes provision for adding explanatory notes.

Quality Assurance/Quality Control
Assess the quality of your data with a feature that calculates and displays the statistical characteristics of the data set. This includes minimum and maximum values, the mean and standard deviation.

Conditional Filtering
Use conditional filtering to interrogate data and isolate subsets of interest. You can construct complex queries and compare and contrast differing data series on one graph.

Integration
DataSight is designed to integrate with GIS applications such as ArcView(TM), ARC/INFO(TM), and MapInfo(TM). What's more, DataSight's ODBC protocol lets you connect third-party statistical or analysis tools to provide additional reporting, analysis, and visualization capabilities.

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3. Meteorology

3.1. Laser Ceilometer Model 8340

	CATEGORY: **Meteorology**
	MANUFACTURER: **AllWeatherInc**
	MODEL: **8340**
MANUFACTURER PRODUCT PAGE: **AllWeatherInce Laser Ceilometer Model 8340**	
Comments:	

Current Class Utilization		
Subject:	Course Number:	
PHY	122	Introduction to Meteorology
PSC	105	Physical Science I
PSC	106	Physical Science I Lab
PSC	107	Physical Science II
PSC	108	Physical Science II Lab

DESCRIPTION: The 8340 Laser Ceilometer measures cloud height and thickness, in addition to vertical visibility, detecting up to four cloud layers simultaneously to a distance of 40,000 vertical feet.

A laser pulse is emitted into the atmosphere and backscatter analyzed. Using the speed of light, the height of each cloud base and top is determined. Due to poorly defined borders or a sparse composition, some clouds are much more difficult to measure than others. Depending on the current and historical sky conditions, an adaptive algorithm determines the number of returns needed to maintain accuracy.

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3.2. WindObserver II Ultrasonic Anemometer

	CATEGORY: **Meteorology**
	MANUFACTURER: **Gill Instruments**
	MODEL: **WindObserver II 2040**
MANUFACTURER PRODUCT PAGE: **Gill WindObserver II Ultrasonic Anemometer**	
Comments:	

Current Class Utilization		
Subject:	Course Number:	
PHY	122	Introduction to Meteorology
PSC	105	Physical Science I
PSC	106	Physical Science I Lab
PSC	107	Physical Science II
PSC	108	Physical Science II Lab

DESCRIPTION: The WindObserver has increased speed range, an optional de-icing system extending the operational temperature range, stainless steel construction, IP66 enclosure, sonic temperature output and averaging
(1-3600s).

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3.3. AirMar PB100 Ultrasonic Weather Station

	CATEGORY: **Meteorology**
	MANUFACTURER: **AirMar Technology**
	MODEL: **PB100**
MANUFACTURER PRODUCT PAGE: **AirMar Ultrasonic Weather Station**	
Comments:	

Current Class Utilization		
Subject:	Course Number:	
PHY	122	Introduction to Meteorology
PSC	105	Physical Science I
PSC	106	Physical Science I Lab
PSC	107	Physical Science II
PSC	108	Physical Science II Lab

DESCRIPTION: The Airmar Ultrasonic Weather Station Instrument detects instantaneous changes in the weather.

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3.4. Maretron WSO100 Ultrasonic Wind / Weather Station

	CATEGORY: **Meteorology**
	MANUFACTURER: **Maretron**
	MODEL: **WSO100**
MANUFACTURER PRODUCT PAGE: **Maretron WSO100 Ultrasonic Wind / Weather Station**	
Comments:	

Current Class Utilization		
Subject:	Course Number:	
PHY	122	Introduction to Meteorology
PSC	105	Physical Science I
PSC	106	Physical Science I Lab
PSC	107	Physical Science II
PSC	108	Physical Science II Lab

DESCRIPTION: Maretron's outdoor weather station measures wind speed and direction, air temperature, barometric pressure, and relative humidity. The wind measurement is performed using ultrasonic sensors, which means there are no moving parts to wear out or to get caught in the rigging.

The WSO100 accurately measures wind speed and direction under tilt of up to 30°, making it ideal for sail as well as power conditions. When used with the Maretron DSM200 display and SSC200 compass, the user will be able to view both apparent and true wind speed and direction as well as dew point and wind chill factor.

Proprietary – Burlington County College use only

3.5. WeatherHawk 916

CATEGORY:
Meteorology

MANUFACTURER:
WeatherHawk

MODEL:
916

MANUFACTURER PRODUCT PAGE:
http://www.weatherhawk.com/index.htm

Comments:

Current Class Utilization		
Subject:	Course Number:	

DESCRIPTION: The Signature Series weather stations are wireless to a host device (PC or server) using fully integrated industrial grade MHz spread spectrum RF communications technology. The model reflects the center frequency of the radio spectrum. The Signature Series wireless systems have an RS232 serial data I/O located on the bottom of the weather station, which can be used as a second serial communications port, or for programming and testing the system, or for direct data downloads using a PC or PDA.

Various external antenna configurations are available for these wireless systems that can extend their LOS (line of sight) range from ½ mile for 900 MHz systems, to over 7 miles; and from ¼ mile for 2.4 GHz systems to over 3 miles.

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CAPABILITIES:

Measurements:
Air Temperature
Wind Speed
Solar Radiation
Relative Humidity
Wind Direction
Barometric Pressure
Rainfall
Pre-calibrated sensor set
Pre-assembled weather station module
Integral bubble level device
RS-232 communications port
Integral 32K data logger that will store up to 22 days of data (assumes hourly sample interval for all seven parameters and ETo)
Calculates and stores daily ETo (evapotranspiration) based on the industry standard Penman-Montieth formula
Environmental Design Features
Conformal Coatings on Electronic Assemblies
Ultraviolet light (solar protection) stabilized enclosure
Weatherproof external connectors for data I/O and power input
Stainless Steel, or powder coated external hardware

MANUALS / SOFTWARE:
SOFTWARE (DISC INCLUDED)
http://www.weatherhawk.com/documents/DescriptionWeatherHawkSignature.pdf
http://www.weatherhawk.com/downloads/Quick%20Start%20Guide.pdf

Proprietary – Burlington County College use only

3.6. SkyScan P5 Portable Lightning Detector

	CATEGORY: **Meteorology**
	MANUFACTURER: **SkyScan**
	MODEL: **P5**
MANUFACTURER PRODUCT PAGE: http://www.skyscanusa.com/products/	
Comments:	

Current Class Utilization		
Subject:	Course Number:	

DESCRIPTION: SkyScan P5 Portable Lightning Detector detects electromagnetic emissions from individual lightning strokes. It has been designed to detect any electromagnetic emissions within a 40 mile radius, and it monitors in all directions. Each detection stays lit for approximately 3 seconds allowing the user to see the distance of that stroke, and compare that detection to the closest detected stroke *(which is retained in the memory for 15 seconds).*

MANUALS / SOFTWARE:
OPERATION MANUAL
http://www.skyscancanada.com/images/P5%20Manual_en.pdf

4. Oceanography

4.1. 21' Hydra Sports 212 WA Boat

	CATEGORY: **Oceanography**
	VENDOR: **Island Marine**
	MODEL: **2007 HYDRASPORTS 212 WA WITH EVINRUDE 150 ETEL MOTOR** **LOADMASTER 220T 314CB TRAILER**
VENDOR PRODUCT PAGE: http://www.imboats.com/	
Comments: Model information http://www.iboats.com/Hydra_Sports_Boats_212_wa/nb/mos15750-y2007/	

Current Class Utilization		
Subject:	Course Number:	
PHY	122	Introduction to Meteorology
PSC	105	Physical Science I
PSC	106	Physical Science I Lab
PSC	107	Physical Science II
PSC	108	Physical Science II Lab
PSC	111	Introduction to Marine Science

DESCRIPTION: Outboard-motor boat. Easy to maintain; designed to withstand harsh saltwater conditions; durable integrated hull design.

SPECIFICATIONS:

- **Length Overall:** 20 Feet and 7 inches.
- **Draft:** 1 Feet
- **Beam:** 8 Feet and 9 inches.
- **Fuel Tank Capacity:** 85
- **Max Load:** 1200
- **Dry Weight:** 2915

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STANDARD FEATURES:

COCKPIT
Baitwell - Insulated 22 Gal. W/ 700 Gph Pump
Cockpit Bolsters
Courtesy Lights
Fishboxes (2) - Insulated 112 Qt. With Overboard Drains
Fishbox Cushions
Pedestal Seats With Cushions
Rear Jump Seats With Cushions
Rod Boxes - Port/Stbd
Self-Draining Cockpit With Scuppers And Diamond Pattern Skid Resistant Deck
Washdown System - Raw Water

CONSOLE & HELM STATION
Accessory Plug - 12 Volt
Compass
Control - Single Binnacle
Drink Holders
Horn
Instrumentation - Fuel, Speed, Tach And Trim
Steering Wheel - Stainless Steel
Tackle Storage Drawers
Windshield

CONSTRUCTION
All Composite (Wood-Free) Construction
Foam-Filled Fiberglass Box Stringer System
Hand-Laid Fiberglass Lamination Utilizing Premium Gelcoat Finish, Bi-Axial Fabric And Woven Roving
Tuff Stuff Composite Transom

ENGINE & SYSTEMS
Bilge Pumps (2) - Automatic - 800 Gph Each
Cabin Access Door - Acrylic
Cabin Sole - Self-Draining Fiberglass With Molded Steps
Carbon Monoxide Detector
Dual Battery Switch
Electrical - Grounded 12 Volt System With Water-Tight Circuit Breakers And Connections
Fuel/Water Separator
Hatch
Hoses - Steel Reinforced
Hydraulic Steering
Navigation Lights
Oil Tank (2-Stroke Only)
Outboard Motor - Factory Rigged

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Propeller - Aluminum
Port Windows With Screens
Storage
Toilet - Portable
V-Berth With Cushion And Storage

HULL AND DECK
Anchor Locker - Self-Draining
Anchor Roller
Bow And Stern Eyes - Stainless Steel
Bow Rails - Welded 316L - Stainless Steel
Bimini Top W/ Boot
Cleats (6) - Thru-Bolted Stainless Steel
Foam Flotation - Basic
Half-Dive Swim Platform W/ Swing Down 2-Step Boarding Ladder
Heavy Duty Gunwale Trim
Rod Holders (4) - Stainless Steel Gunwale Mount
Stainless Steel Thru Hull
Seat Bow - Foredeck

Proprietary – Burlington County College use only

4.2. Gunt-Hamburg Rainfall Hydrograph

	CATEGORY: **Oceanography**
	MANUFACTURER: **Gunt-Hamburg**
	MODEL: **HM-141**
MANUFACTURER PRODUCT PAGE: **Gunt-Hamburg Rainfall Hydrograph HM-141**	
Comments:	

Current Class Utilization		
Subject:	Course Number:	
PHY	122	Introduction to Meteorology
PSC	105	Physical Science I
PSC	106	Physical Science I Lab
PSC	107	Physical Science II
PSC	108	Physical Science II Lab
PSC	111	Introduction to Marine Science

DESCRIPTION: The HM 141 is used to demonstrate the hydrological phenomena of rainfall. It shows the relationships between rainfall and the seepage of rainwater. A stainless steel tank filled with gravel acts as the ground. The water can be drained from the ground using a drainage tube or a filter. A time-controlled motorized water drain distributes the leakage water to 17 transparent measuring tanks. This allows a chronological profile of the discharge of water from the ground to be identified. The ground sample is irrigated by 2 nozzles that can be separately selected using ball valves. A solenoid valve releases the rain. The quantity of rain is adjusted using a control valve and a flow meter. 3 electronic time switches control the irrigation time, the delay time and the measuring time. The unit includes an extra cleaning connection for cleaning the tubes. A tarpaulin is supplied for experiments including a non-permeable layer. Plastic containers that can be inserted in the tank act as rain storage reservoirs.

Learning Objectives / Experiments

- Investigation of the effect of rainfall of varying duration on soil of varying saturation
- Hydrography of different types of irrigation

Proprietary – Burlington County College use only

- Hydrography of saturated or dry gravel
- Investigations of water seepage
- Investigation of capacity of soil to store water
- Ground as a storage medium for water
- Ground with a non-permeable layer
- Comparison of natural and man-made drainage (tile drain)
- Influence of sources on the flow of groundwater
- Overflow of rain storage reservoirs

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4.3. Gunt-Hamburg Sediment Transport Channel

	CATEGORY: **Oceanography** MANUFACTURER: **Gunt-Hamburg** MODEL: **HM-140**
MANUFACTURER PRODUCT PAGE: **Gunt-Hamburg Sediment Transport Channel HM-140**	
Comments: .	

Current Class Utilization		
Subject:	Course Number:	
PHY	122	Introduction to Meteorology
PSC	105	Physical Science I
PSC	106	Physical Science I Lab
PSC	107	Physical Science II
PSC	108	Physical Science II Lab
PSC	111	Introduction to Marine Science

DESCRIPTION: The HM 140 Sediment Transport Flow Channel facilitates the comprehensive investigation of sediment motion. In addition to the channel, 2 different weir bodies as well as a bridge pile are included so that the behaviour of the sediment at these typical hydraulic engineering structures can also be investigated. The flow rate in the channel is determined using a measuring weir that closes the rear of the working section. From there the water flows into the tank before it is pumped back into the channel by the pump. In the inlet section of the channel there is an additional device for filtering out the sediment. A filling of sediment is not included.

Learning Objectives / Experiments

· Investigation of sediment migration
· Sediment behaviour at weirs and other structures
· Visualisation of the behaviour of boundary layers
· Sediment erosion and deposits
· Speed distribution in the flow tank
· Flume flow

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4.4. Gunt-Hamburg Sedimentation Tank

	CATEGORY: **Oceanography**
	MANUFACTURER: **Gunt-Hamburg**
	MODEL: **HM-142**
MANUFACTURER PRODUCT PAGE: **Gunt-Hamburg Sedimentation Tank HM-142**	
Comments: .	

Current Class Utilization		
Subject:	Course Number:	
PHY	122	Introduction to Meteorology
PSC	105	Physical Science I
PSC	106	Physical Science I Lab
PSC	107	Physical Science II
PSC	108	Physical Science II Lab
PSC	111	Introduction to Marine Science

DESCRIPTION:

The HM 142 Model Sedimentation Tank is used to depict the deposition of solid matter suspended in a flowing medium. During this process the effects of different aspects, such as flow speed, flow path, etc. are observed. Fresh water, to which a suspension of known concentration of chalk emulsion in water is added, flows through a sedimentation basin made of transparent plastic. Disturbances can be produced in the flow with the aid of a baffle plate. The sediment content at the basin inlet and outlet is determined using two Imhoff sedimentation cones. The amount of sediment deposited in the basin is determined from this difference. A circulating pump and bypass, which feeds part of the suspension pumped back to the tank, ensure that the suspension is always evenly mixed and no sedimentation takes place in the tank. Ink can be added to the flow of fresh water to demonstrate the flow behaviour in the sedimentation basin and the distribution in the flow observed. The experiment is designed as a laboratory unit and is optimally suited to demonstrations and group experiments in the laboratory.

Proprietary – Burlington County College use only

Learning Objectives / Experiments

· Undisturbed sedimentation
· Sedimentation with baffle plate
· Effect of the baffle plate and its position on the amount of sedimentation
· Flow distribution in the sedimentation basin
· Flow behaviour in the sedimentation basin, qualitative
· Volumetric flow rate and amount of sedimentation
· Efficiency of the sedimentation basin

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4.5. Gunt-Hamburg Surge Tank and Reservoir

	CATEGORY: **Oceanography**
	MANUFACTURER: **Gunt-Hamburg**
	MODEL: **HM-143**
MANUFACTURER PRODUCT PAGE: **Gunt-Hamburg Surge Tank and Reservoir**	
Comments: .	

Current Class Utilization		
Subject:	Course Number:	
PHY	122	Introduction to Meteorology
PSC	105	Physical Science I
PSC	106	Physical Science I Lab
PSC	107	Physical Science II
PSC	108	Physical Science II Lab
PSC	111	Introduction to Marine Science

DESCRIPTION: The HM 143 demonstrates the principle of operation of a surge chamber and the non-steady state flow behaviour of water as, e.g., occurs at dams and in retention basins. In both systems the water rises before it is fed via an overflow to a load (e.g. a turbine) or a reservoir. A device that is capable, e.g., of absorbing pressure surges produced by a sudden change in the flow rate is termed a ”surge chamber” (used e.g. in hydroelectric power stations) The surge chamber is often designed as a cylindrical shaft in which the oscillation of the pressure pulse can subside undisturbed. The model system is equipped with pressure sensors. The pressure conditions that occur and the oscillations caused by a pressure surge are recorded using a chart recorder.

Learning Objectives / Experiments

· Principle of a surge chamber
· Determination of the natural frequency of the surge chamber
· Flow behaviour in a water reservoir
· Flow behaviour in a retention basin

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4.6. Gunt-Hamburg Surge Tank and Water Hammer Unit

	CATEGORY: **Oceanography**
	MANUFACTURER: **Gunt-Hamburg**
	MODEL: **HM-156**
MANUFACTURER PRODUCT PAGE: **Gunt-Hamburg Surge Tank and Water Hammer Unit HM-156**	
Comments: .	

Current Class Utilization		
Subject:	Course Number:	
PHY	122	Introduction to Meteorology
PSC	105	Physical Science I
PSC	106	Physical Science I Lab
PSC	107	Physical Science II
PSC	108	Physical Science II Lab
PSC	111	Introduction to Marine Science

DESCRIPTION: Pressure surges in pipes or structures carrying water are a technical problem that should not be underestimated. In the majority of cases reservoirs have a surge chamber to trap pressure surges caused by a change in the flow speed of the water. Pipe systems must, in turn, be so designed that the pressure surges occurring there (caused, e.g., by the sudden closing of a valve) can be survived without damage. Pressure surges can be generated in a pipe on the HM 156. The oscillations during this pressure surge are displayed on a storage oscilloscope available as an optional extra. In addition, it is also possible to display the decay of a pressure surge in a surge chamber. The pressure oscillations in the surge chamber are recorded using a recorder module (accessory HM 156.01).

Learning Objectives / Experiments

· Pressure surges in a pipe
· Principle of operation of a surge chamber
· Calculation of the speed of sound in the pipe (with oscilloscope available as an option)

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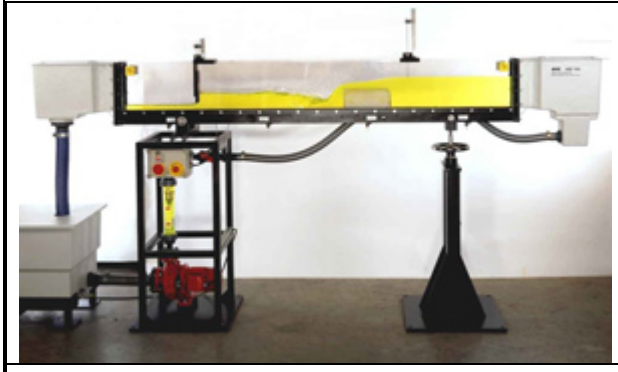
4.7. Gunt-Hamburg Surge Multi-Purpose Teaching Flume

	CATEGORY: **Oceanography**
	MANUFACTURER: **Gunt-Hamburg**
	MODEL: **HM-160**
MANUFACTURER PRODUCT PAGE: **Gunt-Hamburg Multi-Purpose Teaching Flume HM-160**	
Comments: .	

Current Class Utilization		
Subject:	Course Number:	
PHY	122	Introduction to Meteorology
PSC	105	Physical Science I
PSC	106	Physical Science I Lab
PSC	107	Physical Science II
PSC	108	Physical Science II Lab
PSC	111	Introduction to Marine Science

DESCRIPTION: Using the HM 160 Multi-Purpose Teaching Flume in conjunction with the comprehensive accessories, the behaviour of flows can be demonstrated in numerous experiments. This makes it possible for researchers and students to carry out experiments, above all, in the area of open flume structures in hydraulic engineering. The measuring section of the base unit is 2.5 m long and has transparent side walls. This can be extended to 5 m by adding an additional element. Important elements of the Multi-Purpose Teaching Flume are the specially shaped inlet area by means of which a homogeneous flow is obtained, a centrifugal pump for setting up the water circuit, a flow rate measuring device and a manual inclination adjustment mechanism designated to compensate flow losses or to simulate natural slope.

Learning Objectives / Experiments

Numerous experiments are possible with the comprehensive accessories, e.g.:
Demonstration of the influence of the wall shape on the flow velocity
Investigation of the transition from running to shooting flow
Investigation of flow processes on a wide range of components and weirs

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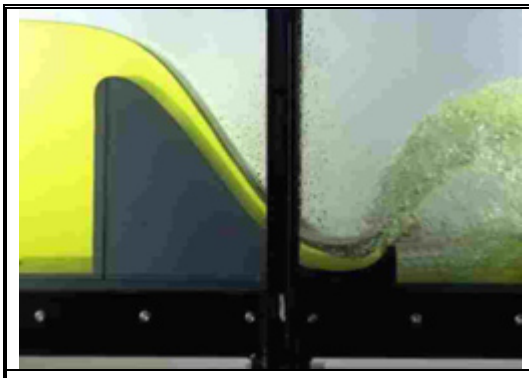
4.8. Gunt-Hamburg Spillway with Ski Jump

	CATEGORY: **Oceanography**
	MANUFACTURER: **Gunt-Hamburg**
	MODEL: **HM-160.28**
MANUFACTURER PRODUCT PAGE: **Gunt-Hamburg Spillway with Skijump HM-160.28**	
Comments: .	

Current Class Utilization		
Subject:	Course Number:	
PHY	122	Introduction to Meteorology
PSC	105	Physical Science I
PSC	106	Physical Science I Lab
PSC	107	Physical Science II
PSC	108	Physical Science II Lab
PSC	111	Introduction to Marine Science

DESCRIPTION: The spillway with ski jump is a so-called fixed weir. The weir body is made of plastic and is locked in place in the measuring section using a bolt. The weir body is sealed to the side walls of the flume using tubular seals that are inserted in the slots on the side of the weir body. On passing the weir, the flow changes from the flow state to the supercritical flow state, the ramp at the end of the spillway ensures that the flow is gently returned to its original state. In practice, such weirs are used after long sections of gradient where the direct impact of the flow over an extended period would cause serious damage, e.g. due to erosion.

Learning Objectives / Experiments

In conjunction with the HM 160, the following experiments are possible:

· Observation of flow forms
· Observation of the throw of the water
· Generation of different flow states by damming the down-stream water

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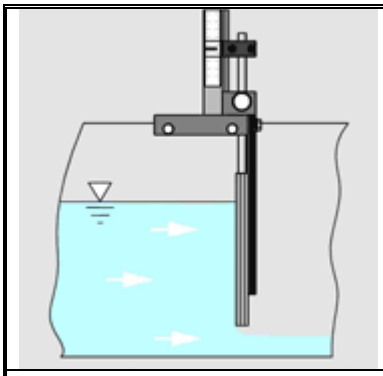
4.9. Gunt-Hamburg Adjustable Undershot Weir

	CATEGORY: **Oceanography**
	MANUFACTURER: **Gunt-Hamburg**
	MODEL: **HM-160.29**
MANUFACTURER PRODUCT PAGE: **Gunt-Hamburg Adjustable Undershot Weir HM-160.29**	
Comments: .	

Current Class Utilization		
Subject:	Course Number:	
PHY	122	Introduction to Meteorology
PSC	105	Physical Science I
PSC	106	Physical Science I Lab
PSC	107	Physical Science II
PSC	108	Physical Science II Lab
PSC	111	Introduction to Marine Science

DESCRIPTION: The undershoot weir is one of the adjustable forms of weir, the water passes underneath the weir gate. The experimental set-up is placed on the side walls of the flume and fixed in place with bolts. The set-up consists of a sturdy unit, a holder for the adjustable weir gate and a scale on which the height of the flow cross-section can be read. Plastic tubular seals inserted in slots on the side of the weir gate complete the experimental set-up. In practice, these simple to construct and thus economical undershot weirs are used to obtain a constant flow from a varying upper water level.

Learning Objectives / Experiments

In conjunction with the HM 160, the following experiments are possible:

· Observation of flow forms
· Observation of the flow under an undershot weir:
- Observation of hydraulic motion on discharge
- Observations on the movement of upper rollers
· Relationship between dam height and discharge

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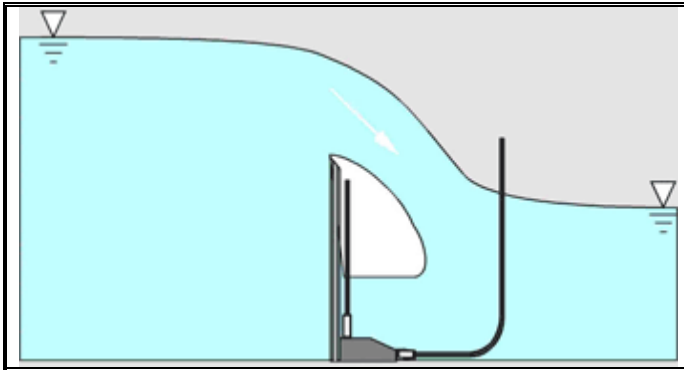
4.10. Gunt-Hamburg Overshoot Weir

	CATEGORY: **Oceanography**
	MANUFACTURER: **Gunt-Hamburg**
	MODEL: **HM-160.30**
MANUFACTURER PRODUCT PAGE: **Gunt-Hamburg Overshoot Weir HM-160.30**	
Comments: .	

Current Class Utilization		
Subject:	Course Number:	
PHY	122	Introduction to Meteorology
PSC	105	Physical Science I
PSC	106	Physical Science I Lab
PSC	107	Physical Science II
PSC	108	Physical Science II Lab
PSC	111	Introduction to Marine Science

DESCRIPTION: The overshoot weir is one of the fixed forms of weirs, the water flows over the weir. The experimental set-up is placed on the flume base and positioned using bolts. The set-up consists of the weir plate on a mounting frame and lockable aeration tubes. Plastic tubular seals inserted in slots on the side of the weir plate complete the experimental set-up. The weir crest is chamfered at 45° and thus enables sharp edged, aerated overshoot. On real weirs, aerated overshoot is used to prevent oscillations in the weir locks; in the experiment the influence of the aerated zone on the flow at different flow rates is demonstrated.

Learning Objectives / Experiments
In conjunction with the HM 160, the following experiments are possible:
Discharge on an overflow weir
Investigation of flow action on aerated and non-aerated overflow
Occurrence of separation on a sharp edged weir
Difference between attached and separated flow

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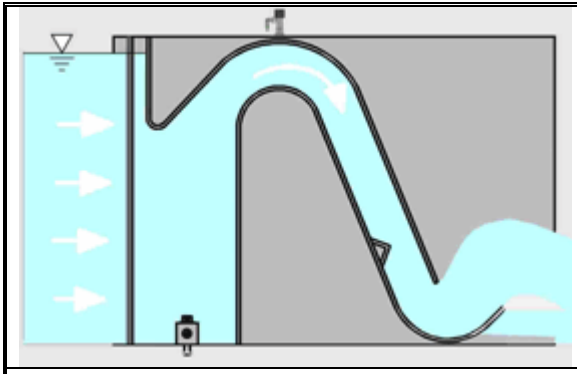
4.11. Gunt-Hamburg Siphon Spillway



CATEGORY:
Oceanography

MANUFACTURER:
Gunt-Hamburg

MODEL:
HM-160.36

MANUFACTURER PRODUCT PAGE:
Gunt-Hamburg Siphon Spillway HM-160.36

Comments:
.

Current Class Utilization		
Subject:	Course Number:	
PHY	122	Introduction to Meteorology
PSC	105	Physical Science I
PSC	106	Physical Science I Lab
PSC	107	Physical Science II
PSC	108	Physical Science II Lab
PSC	111	Introduction to Marine Science

DESCRIPTION: The siphon weir is a type of solid overflow weir. The discharge area of the weir is shaped like a closed canal. As soon as the water flows over the highest point, an overhang permits automatic action of the siphon weir. In contrast to a normal overflow weir, the flow takes place within a pipe rather than free flow. The utilization of the intake effect makes flow rates larger than those of an overflow weir possible. A ventilation valve is used to regulate the flow rate. The Plexiglas experiment is placed on the bottom of the flume and attached with bolts. The experimental set-up is fitted with seals on insertion in the flume.

Learning Objectives / Experiments
In conjunction with the HM 160, the following experiments are possible:
· Function of a siphon weir
· Flow rate and drain coefficients of a siphon weir
· Pipe flows
· Comparison of overflow and siphon weirs
· Cavitation processes on overflow and siphon weirs

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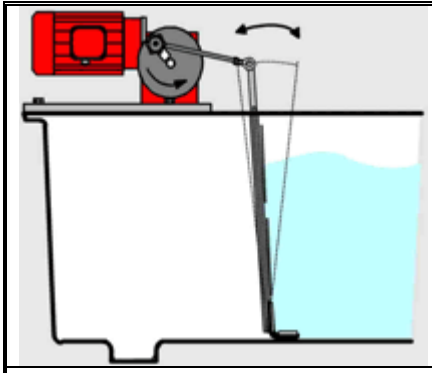
4.12. Gunt-Hamburg Wave Generator Flap-Type

	CATEGORY: **Oceanography**
	MANUFACTURER: **Gunt-Hamburg**
	MODEL: **HM-160.41**
MANUFACTURER PRODUCT PAGE: **Gunt-Hamburg Wave Generator Flap-Type HM-160.41**	
Comments: .	

Current Class Utilization		
Subject:	Course Number:	
PHY	122	Introduction to Meteorology
PSC	105	Physical Science I
PSC	106	Physical Science I Lab
PSC	107	Physical Science II
PSC	108	Physical Science II Lab
PSC	111	Introduction to Marine Science

DESCRIPTION: The HM 160.41 Wave Generator is used to generate waves in the HM 160 Multi-Purpose Teaching Flume. The unit consists of a powerful geared motor unit that operates a displacement flap via a crank disc and a continuously adjustable drive rod. The flap is fixed to the base of the flume by means of a rubber mounting and swings back and forward. The frequency of the resulting waves can be adjusted by changing the motor speed; the amplitude of the waves can be adjusted by changing the stroke. The motor gearbox unit is fitted to a base plate that is placed in the discharge area of the flume and fixed in place using bolts. It is possible to perform experiments on waves both with and without flow.

Learning Objectives / Experiments

· Investigations on waves
- Amplitude
- Frequency
- Forces
- Velocity
- Different wave shapes

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- Wave reflections
· Absorption of wave forces
· Behaviour of structures in rough sea

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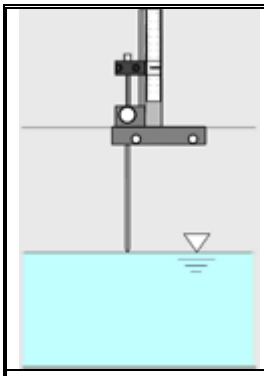
4.13. Gunt-Hamburg Level Gauge

	CATEGORY: **Oceanography**
	MANUFACTURER: **Gunt-Hamburg**
	MODEL: **HM-160.52**
MANUFACTURER PRODUCT PAGE: **Gunt-Hamburg Level Gauge HM-160.52**	
Comments: .	

Current Class Utilization		
Subject:	Course Number:	
PHY	122	Introduction to Meteorology
PSC	105	Physical Science I
PSC	106	Physical Science I Lab
PSC	107	Physical Science II
PSC	108	Physical Science II Lab
PSC	111	Introduction to Marine Science

DESCRIPTION: The HM 160.52 Level Gauge is used to measure the water level in the HM 160 Multi-Purpose Teaching Flume. It consists of a probe using which the surface of the water is touched. The height of the water is read off on a millimeter scale with the aid of an indicator. The device is fitted to a supporting plate that is placed on the side walls of the flume and locked with clamping bolts. The Level Gauge can be fitted at any point along the working section.

Learning Objectives / Experiments

· Measurement of water levels

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5. Scientific Photography

5.1. Meiji Techno Polarizing Microscope

<table>
<tr><td colspan="2"> </td><td>CATEGORY:
Scientific Photography</td></tr>
<tr><td colspan="2"></td><td>MANUFACTURER:
Meiji Techno</td></tr>
<tr><td colspan="2"></td><td>MODEL:
ML9730</td></tr>
<tr><td colspan="3">MANUFACTURER PRODUCT PAGE:
Meiji Techno Polarizing Microscope ML9730</td></tr>
<tr><td colspan="3">Comments:
.</td></tr>
</table>

Current Class Utilization		
Subject:	Course Number:	
BIO	103	General Biology I
BIO	104	General Biology I Lab
BIO	107	General Biology II
BIO	108	General Biology II Lab
BIO	155	Basic Microbiology
BIO	156	Basic Microbiology Lab

DESCRIPTION:

HWF10X & HWF10XF eyepieces with reticle
SM Plan objectives 4X, 10X, 40X
Graduated 360º rotatable stage with vernier
Strain Free Achromatic NA1.25 with iris & filter holder
Rotatable polarizer with analyzer
Bertrand lens with field limited stop at 0º and 90º
Koehler Halogen 12V 50W illuminator
Optional Senarmont compensator available

Proprietary – Burlington County College use only

5.2. MC3000 3.3 Megapixel Digital Camera Kit

	CATEGORY: **Scientific Photography**
	MANUFACTURER: **Microscope world**
	MODEL: **MC3000**
MANUFACTURER PRODUCT PAGE: **Microsope World 3.3 Megapixel Digital Camera Kit**	
Comments: .	

Current Class Utilization		
Subject:	Course Number:	

DESCRIPTION:

Digital High Speed Video Imaging System: CMOS camera offers rates of 1,000 pictures per second at 1024 x 1024 pixels. SR-CMOS Technology.

The Phantom v5.1 offers a maximum recording speed of 1,200 pictures per second using the sensor's full 1024x1024 pixel array. Frame rates are continuously variable from 30 to 1,200 pictures per second. Higher frame rates, up to 95,000pps, at reduced image sizes may also be selected using the Phantom camera control software.

The Phantom software that is included with each camera provides the user with controls to setup camera operating parameters while viewing the "live" image on the controlling computer's monitor or NTSC video monitor. Frame rate, shutter speed, and EDR functions are set here before the shot.

The software also provides controls for recorded image playback directly from camera memory or archived image files. Image analysis functions are also included in this part of the software and feature measurement, speed, and angular data that can reviewed on site immediately after the test. This software may also be run on a desktop PC for additional analysis and data report generation, presentations, or training purposes at any time.

Proprietary – Burlington County College use only

5.3. Shimadzu Infrared Microscope AIM-8800

	CATEGORY: **Scientific Photography**
	MANUFACTURER: **Shimadzu**
	MODEL: **AIM-8800**
MANUFACTURER PRODUCT PAGE: **Shimadzu Infrared Microscope AIM-8800**	
Comments: .	

Current Class Utilization		
Subject:	Course Number:	

DESCRIPTION: This infrared microscope provides control of stage movement, aperture setting and focusing, all from the PC screen. Supporting analysis using transmission, reflection as well as ATR methods, the AIM-8800 widens the range of application fields. With emphasis on sensitivity for basic performance of this infrared microscope, ease of operation was also a high design priority.

Proprietary – Burlington County College use only

5.4. Orion StarShoot Deep Space Imaging Camera II

	CATEGORY: **Scientific Photography**
	MANUFACTURER: **Orion**
	MODEL: **DSCI II**
MANUFACTURER PRODUCT PAGE: **Orion StarShoot Deep Space Imaging Camera II**	
Comments: .	

Current Class Utilization		
Subject:	Course Number:	
PHY	120	Introduction to Astronomy
PHY	121	Introduction to Astronomy Lab
PSC	110	Project Universe-Introduction to Astronomy

DESCRIPTION:

The camera is powered from the USB connection to the computer. The TEC system requires external 3VDC power. The included 3VDC power supply is a high-quality plastic enclosure with a 6' long cable. It requires two D-cell batteries. Some computers have USB ports that are known to not meet the USB specification for the output voltage. These computers may not be able to run the SSDSI-2 without the use of an external powered hub. The vast majority of computers, however, do meet the proper USB specification, and should have no problems running the SSDSI-2 off of regular USB power.

Proprietary – Burlington County College use only

5.5. Orion StarShoot Pro Deep Space Color Imager

CATEGORY:
Astrophotography

MANUFACTURER:
Orion

MODEL:
52084

MANUFACTURER PRODUCT PAGE:
http://www.telescope.com/control/main

Comments:

Current Class Utilization		
Subject:	Course Number:	

DESCRIPTION:

The Orion StarShoot Pro V2.0 Deep Space Color CCD is thermoelectrically cooled to dramatically reduce thermal noise. A small fan on the back enhances cooling efficiency even more. Thermoelectric cooling can be manually shut off via software control, to eliminate dew in extreme outdoor conditions. Maxim DL Essentials software is included for total control of focusing, image capture, and image processing. Power is supplied via a single 12-volt DC cigarette lighter plug on a 10 foot cable.

CAPABILITIES:

High resolution 6.1-megapixel CCD color astro camera.
Sony 25.10mm x 17.64mm CCD chip features 3032 x 2016 pixel array.
TEC cooling with manual shutoff plus rear fan dramatically minimize thermal noise for smoother images

Proprietary – Burlington County College use only

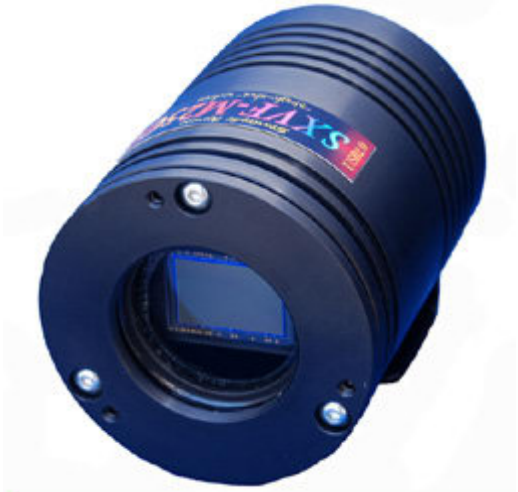
16-bit dynamic range yields better image depth than all but the priciest DSLRs
Compatible with Windows XP and Vista 32-bit Operating Systems

MANUALS / SOFTWARE:

INSTRUCTION MANUAL
ORION STARSHOOT IMAGING SYSTEMS – IMAGING SOFTWARE AND DRIVERS

Proprietary – Burlington County College use only

5.6. Starlight XPress SXVF-M25C CCD Color Camera

	CATEGORY: **Astrophotography**
	MANUFACTURER: **Starlight XPress**
	MODEL: **SXVF-M25C**
MANUFACTURER PRODUCT PAGE: http://www.starlight-xpress.co.uk/SXV-M25.htm	
Comments:	

Current Class Utilization		
Subject:	Course Number:	

DESCRIPTION: The Starlight Xpress SXVR-M25C is an APS sized 6 megapixel color cooled CCD camera based on the Sony ICX413AQ SuperHAD CCD. The SXVR-M25C provides a 3024 x 2016 array of 7.8 x 7.8 micron pixels

MANUALS / SOFTWARE:
SOFTWARE (DISC INCLUDED)

Proprietary – Burlington County College use only

5.7. Starlight Xpress SXVF-H36

	CATEGORY: **Astrophotography**
	MANUFACTURER: **Starlight Xpress**
	MODEL: **SXVF-H36**
MANUFACTURER PRODUCT PAGE: http://www.starlight-xpress.co.uk/SXVF-H35-36.htm	
Comments:	

Current Class Utilization		
Subject:	Course Number:	

DESCRIPTION: The SXVR-H36 is a large format 35mm / APS cooled CCD camera featuring a 16 Megapixel CCD chip. The Kodak KAI16000M interline CCD chip features a 4904 x 3280 array of 7.4 x 7.4 micron pixels. To reduce the negative effects of the greater Kodak dark signal, these cameras employ a two stage Peltier cooler for an extra 10 degree reduction in the CCD temperature, and a high-speed USB2 interface circuit to greatly reduce the download time. The fast download minimizes the visibility of bias frame artifacts, such as hot columns and the top to bottom gradient that is commonly seen on such chips.

MANUALS / SOFTWARE:
SOFTWARE (DISC INCLUDED)

Proprietary – Burlington County College use only

5.8. Meade 1209 Zero Image-Shift Microfocuser

	CATEGORY: **Astrophotography**
	MANUFACTURER: **Meade**
	MODEL: **1209**
MANUFACTURER PRODUCT PAGE: http://www.meade.com/	
Comments:	

Current Class Utilization		
Subject:	Course Number:	

DESCRIPTION: Meade Zero Image-Shift 1209 Microfocuser operates at four speeds from extremely slow to fast and threads directly onto the telescope's rear cell. The format of the #1209 unit allows for direct insertion of 2"-barrel eyepieces or diagonal mirrors; an adapter for 1.25"-barrel eyepieces or diagonals is included as well.

CAPABILITIES:

- Provides extremely precise image focus
- Control handbox included
- Fits all Schmidt-Cassegrain models
- Allows for direct insertion of 2"-barrel eyepieces or diagonal mirrors
- Adaptable for 1.25"-barrel eyepieces or diagonals

MANUALS / SOFTWARE:

Operating Instructions
http://www.meade.com/manuals/accessories/microfocuser.pdf

Proprietary – Burlington County College use only

6. Mobile Science Classroom

6.1. Microsoft Surface Computer

<table>
<tr><td rowspan="3"> </td><td>CATEGORY:
Mobile Science Classroom</td></tr>
<tr><td>MANUFACTURER:
Microsoft</td></tr>
<tr><td>MODEL:
Microsoft Surface</td></tr>
<tr><td colspan="2">MANUFACTURER PRODUCT PAGE:
http://www.microsoft.com/surface/en/us/Pages/Product/WhatIs.aspx</td></tr>
<tr><td colspan="2">Comments:
For more information on applications, please contact NASA staff</td></tr>
</table>

Current Class Utilization		
Subject:	Course Number:	

DESCRIPTION: Multi-touch computer that responds to natural hand gestures and real-world objects. A large, horizontal user interface.

CAPABILITIES:
Direct interaction. Users can grab digital information with their hands and interact with content on-screen by touch and gesture – without using a mouse or keyboard.

Multi-touch. Microsoft Surface responds to many points of contact simultaneously - not just from one finger, as with a typical touch screen, but from dozens of contact points at once.
Object recognition. Users can place physical objects on the screen to trigger different types of digital responses – providing for a multitude of applications and the transfer of digital content to mobile devices.

6.2. Vehicle Ford Motor H

CATEGORY:
Mobile Science Classroom

MANUFACTURER:
Farber Industries

MODEL:
Vehicle Ford Motor H

MANUFACTURER PRODUCT PAGE:
http://www.fsvcc.com/classroom/

Comments:
For more information, please contact Christine Lipsack at 609-893-1765

ADDITIONS:

- Solar Panel (7 amps at 12V)
- Inverter
- Batteries
- Wire
- Wind Turbine
- RV mount kit with pole
- 50 Amp Circuit Breaker
- Stop switch for turbine
- Awnings
- Weatherguard electric roll up exterior awning
- Carefree Mirage lateral arm box awning
- Electronic
- 40” LCD monitor, NEC 4010, with exterior view w/ weather-proof door
- Microphone
- Peavey audio system w/mixer and front and rear wall mounted speakers
- Exterior speakers
- Sony SLVD380P, VCR/DVD combo player, cabinet mounted
- L-Track along floor

Proprietary – Burlington County College use only

7. Physical Science

7.1. Seismometer Ks-2000m

	CATEGORY: **Physical Science**
	MANUFACTURER: **Geotech Instruments**
	MODEL: **Ks-2000m**
MANUFACTURER PRODUCT PAGE: http://www.geoinstr.com/	
Comments: Manual http://www.geoinstr.com/pub/manuals/ks-2000b.pdf	

Current Class Utilization		
Subject:	Course Number:	

MANUALS / SOFTWARE:
OPERATION MANUAL
http://www.geoinstr.com/pub/manuals/ks-2000b.pdf

Proprietary – Burlington County College use only

7.2. Digitizer Smart-24-R

CATEGORY:
Physical Science

MANUFACTURER:
Geotech Instruments

MODEL:
24-R

MANUFACTURER PRODUCT PAGE:
http://www.geoinstr.com/smart24.htm

Comments:

Current Class Utilization		
Subject:	Course Number:	

DESCRIPTION: The SMART Series of instruments represent the logical solution for seismological data acquisition: a common design for a digitizer, portable recorder, and strong-motion recorder (the all-in-one solution).

A strong motion recorder can simultaneously record continuously weak motion data on a large selection of media: up to 120 GB hard disks, Compact Flash memory, etc. All units are telemetry ready using the CD1.1 protocol. Very low power consumption is supplemented by a complete set of serial and Ethernet communication ports. A SEEDLink plug-in is also provided.

MANUALS / SOFTWARE: OPERATION MANUALS
Smart Series User's Manual
http://www.geoinstr.com/pub/manuals/smart24um.pdf
Smart Series Command & Setup Protocol
http://www.geoinstr.com/pub/manuals/smart24csp.pdf
Smart24 Config User's Manual / (Software included)
http://www.geoinstr.com/pub/manuals/smart24csp.pdf
SeisPlus v4.4 Manual (Software included)
http://www.geoinstr.com/pub/manuals/seisplus.pdf

Proprietary – Burlington County College use only

7.3. Soil Test Kit

	CATEGORY: **Physical Science**
	MANUFACTURER: **LaMotte**
	MODEL: **NPK**
MANUFACTURER PRODUCT PAGE: http://www.lamotte.com/pages/edu/5880.html	
Comments:	

Current Class Utilization		
Subject:	Course Number:	

DESCRIPTION: Perform up to fifty tests each for nitrogen, phosphorus, and potassium levels using non-hazardous TesTabs. Each kit includes the necessary apparatus, simple diagrammed instructions, and a laminated color chart.

Proprietary – Burlington County College use only

7.4. Nitrogen in Soil Testing Kit

CATEGORY:
Physical Science

MANUFACTURER:
LaMotte

MODEL:
ST-N

MANUFACTURER PRODUCT PAGE:
http://www.lamotte.com/

Comments:
(not actual kit picture)
http://www.lamotte.com/pages/common/pdf/instruct/5420.pdf

Current Class Utilization		
Subject:	Course Number:	

DESCRIPTION: SOIL SAMPLING
LaMotte Soil Handbook to prepare the soil sample.

EXTRACTION

- Use the 1 mL pipet (0354) to add 1 mL of *Acid Extracting Solution (6361) to a test tube (0701). Dilute to the 15 mL line with deionized water.

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- Use 1.0g spoon (0697) to add three measures of soil. Use 0.5 mL pipet (0369) to add 0.5 mL of Charcoal Suspension (5638). Cap and shake for 5 minutes.

- Fold filter paper in half then in half again to form a triangle. Squeeze corners together to open filter paper and form a cone. Insert into funnel (0459).

- Filter sample into a second graduated vial. This liquid will be used as the sample in the test.

NITROGEN TEST

- Fill a test tube (0755) to the 3 mL line with filtered soil extract.
- Dilute to 6 mL line with *Mixed Acid Reagent (V-6278). Cap and mix.
- Use the 0.1g spoon (0699) to add one measure of *Nitrate Reducing Reagent (V-6279). Cap and mix.
- Mix by inverting approximately 50-60 times in a period of one minute. Wait 10 minutes.
- Holding tube ½ inch above white area of color chart (1371), match sample color to a color standard. Use chart to convert result to a reading. Record as lb/A Nitrogen.

Proprietary – Burlington County College use only

7.5. Home Water Analysis Kit

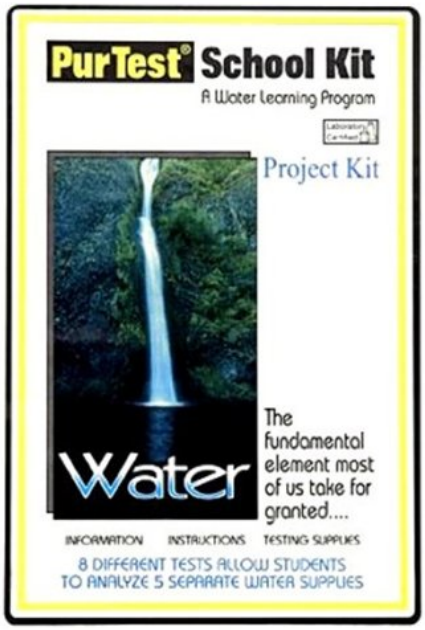
	CATEGORY: **Physical Science** MANUFACTURER: **PurTest** MODEL: **Home Water Analysis**
MANUFACTURER PRODUCT PAGE: http://www.purtest.com/page7a.html	
Comments:	

Current Class Utilization		
Subject:	Course Number:	

DESCRIPTION: PurTest® Home Water Analysis kit includes: the Bacteria, Nitrate, Nitrite kit, Iron Hardness Plus, the Pesticide kit, and a Lead test kit. This kit allows the user to screen water for contaminates and various conditions.

Proprietary – Burlington County College use only

7.6. PurTest School Kit

<table>
<tr><td> 
</td><td>CATEGORY:
Physical Science

MANUFACTURER:
PurTest

MODEL:
P-SSKIT</td></tr>
<tr><td colspan="2">MANUFACTURER PRODUCT PAGE:
http://www.purtest.com/</td></tr>
<tr><td colspan="2">Comments:</td></tr>
</table>

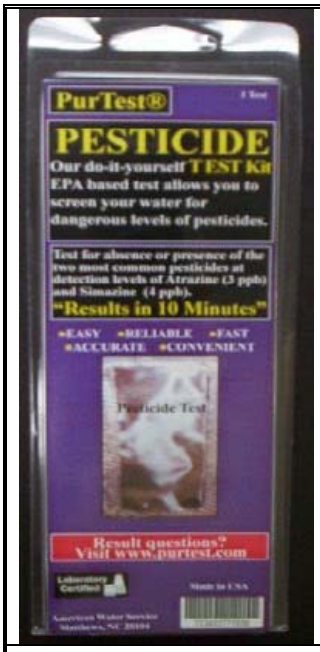
Current Class Utilization		
Subject:	Course Number:	

DESCRIPTION: Includes two informative water knowledge booklets and enough test strips for five students to participate in eight different experiments.

CAPABILITIES:
Tests included: nitrates, nitrites, pH, alkalinity, hardness, chlorine, copper, and iron
Five testing strips are included for each individual test
A total of five vials are included
Also comes with five bifold brochures

Proprietary – Burlington County College use only

7.7. Pesticide Test

<table>
<tr><td> 
</td><td>CATEGORY:
Physical Science

MANUFACTURER:
PurTest

MODEL:
Pesticide Test</td></tr>
<tr><td colspan="2">MANUFACTURER PRODUCT PAGE:
http://www.purtest.com/page11.html</td></tr>
<tr><td colspan="2">Comments:</td></tr>
</table>

Current Class Utilization		
Subject:	Course Number:	

DESCRIPTION: The PurTest Pesticide test detects two of the most Common pesticides used in the US at or below the EPA maximum contaminant level (atrazine-3 ppb and simazine - 4 ppb).

7.8. Lortone Panther 14 Slab Saw

	CATEGORY: **Physical Science**
	MANUFACTURER: **Lortone**
	MODEL: **HM-160.28**
MANUFACTURER PRODUCT PAGE: http://www.lortone.com/slab_saws.html	
Comments:	

Current Class Utilization		
Subject:	Course Number:	

DESCRIPTION: **Slab saws** are used in the first step of exposing the natural patterns and beauty of the stone.

Features: sealed high-performance bearings, high speed fixed rate power feed, delivers cuts at 17-1/2in. per hour, rugged 5-1/2in. x 6 3/4in. capacity vise, and threaded crossfeed, separate blades sharpened vise, 1/2 HP heavy duty motor, 14in. x .080 x 5/8in. EXP smooth cut diamond blade.

MANUALS / SOFTWARE:
LSS-14P INSTRUCTIONS AND PARTS LIST
http://www.lortone.com/pdf/LSS14_Parts_List.pdf

Proprietary – Burlington County College use only

7.9. Rocks and Minerals Deluxe Set

<table>
<tr><td rowspan="3"> </td><td>CATEGORY:
Physical Science</td></tr>
<tr><td>MANUFACTURER:
Home Training Tools</td></tr>
<tr><td>MODEL:
RM-RMCOLL</td></tr>
<tr><td colspan="2">MANUFACTURER PRODUCT PAGE:
http://www.hometrainingtools.com/rocks-minerals-deluxe-set/p/RM-RMCOLL/</td></tr>
<tr><td colspan="2">Comments:</td></tr>
</table>

Current Class Utilization		
Subject:	Course Number:	

DESCRIPTION: 50 number-coded un-mounted 1" specimens. Specimens include examples of igneous, sedimentary and metamorphic rocks, ores, and gemstones. Nine of the ten hardness levels from the Mohs scale of hardness are included (all but diamond, the hardest). Quality compartmented storage box and complete Rocks & Minerals Study Guide are included.

MANUALS / SOFTWARE:
ROCKS, MINERALS, AND GEMSTONES (STUDY GUIDE INCLUDED)

Proprietary – Burlington County College use only

7.10. MD-10 Mini X-Ray Diffractometer

CATEGORY:
Physical Science

MANUFACTURER:
MTI Corporation

MODEL:
EQ-MD-10

MANUFACTURER PRODUCT PAGE:
http://www.mtixtl.com/md-10precisionminix-raydiffractometerwithsoftwareandlaptopcomputer.aspx

Comments: Precision Mini X-Ray Diffractometer with Software & Laptop Computer - EQ-MD-10

Current Class Utilization		
Subject:	Course Number:	

DESCRIPTION: For conducting phase analysis of powders.

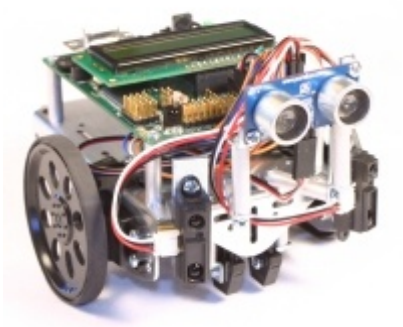
The EQ-MD-10 precision mini XRD integrates the state of art technology in X-Ray. It has the compact size of a microwave oven; however, it performs phase analysis of powders with accuracy and speed comparable to those of full-scale laboratory instruments. This is a cost effective solution for R&D and education labs, industrial quality control lab, mobile laboratories for any transportation facility, and it has been used successfully in materials research, geology, ocean studies, ecology, forensic science, and many other applications.

MANUALS / SOFTWARE:
INSTRUCTIONS FOR QUICK TEST
http://www.mtixtl.com/productimages/machine/md-10-xrd/MD10-Quicktest.pdf

Proprietary – Burlington County College use only

8. Robotics

8.1. IntelliBrain-Bot

	CATEGORY: **Robotics**
	MANUFACTURER: **Ridgesoft**
	MODEL: **IntelliBrain-Bot**
MANUFACTURER PRODUCT PAGE: http://www.ridgesoft.com/intellibrainbot/intellibrainbot.htm	
Comments: INTELLIBRAIN-BOT DELUXE INSTRUCTIONS (GUIDE INCLUDED)	

Current Class Utilization		
Subject:	Course Number:	

DESCRIPTION: The IntelliBrain-Bot educational robot is designed to bring computer science, robotics and engineering concepts alive for students.

The IntelliBrain-Bot educational robot is fully Java programmable and includes the RoboJDE™ Java-enabled robotics software development environment. The IntelliBrain-Bot Deluxe educational robot includes an IntelliBrain 2 robotics controller, two wheel encoder sensors, two line sensors, two infrared range sensors and an ultrasonic range sensor.

Proprietary – Burlington County College use only

9. Rocketry

9.1. Estes Alpha III Rockets

	CATEGORY: **Rocketry**
	MANUFACTURER: **AC Supply**
	MODEL: **Alpha III**
MANUFACTURER PRODUCT PAGE: http://www.acsupplyco.com/estes/alpha3.htm	
Comments:	

Current Class Utilization		
Subject:	Course Number:	
		BCC Summer Science Camp

DESCRIPTION: One of the oldest, most reliable, easiest to build rockets with a dynamic decor - gloss black body tube, fluorescent orange plastic fin unit and nose cone. Gloss black body tube, fluorescent orange plastic fin unit and nose cone.

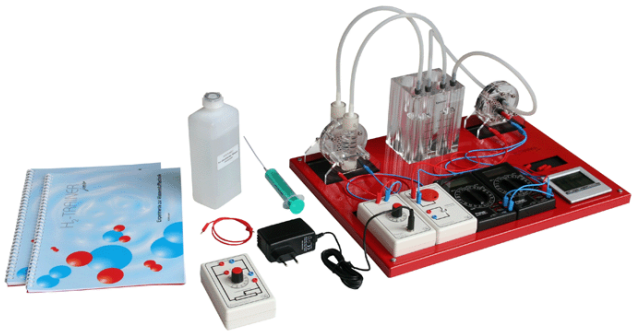
Specifications:

- Length: 12.25" (31.1cm)
- Diameter: 0.976" (24.8mm)
- Weight: 1.2 oz (34g)
- Max Altitude: 1100 ft (333 meters)
- Recovery: 12" Parachute
- Fins: Plastic
- Engines: A8-3, A8-5, B4-4, B6-4, B6-6, C6-5, C6-7

Proprietary – Burlington County College use only

10. Alternative Energy Technologies

10.1. Basic Hydrogen Fuel Cell Trainer

	CATEGORY: **Alternative Energy**
	MANUFACTURER: **US Didactic**
	MODEL: **AE 102**
MANUFACTURER PRODUCT PAGE: http://www.usdidactic.com/html/alternative_energy_educational.html	
Comments:	

Current Class Utilization		
Subject:	Course Number:	

DESCRIPTION: All required electronics and metering are included together with a rugged base plate.

Equipment:

- Red carrying case with foam cutouts to store and protect components
- Experiment platform constructed to hold components & meters
- Electrolyzer
- Power supply
- Current control box
- Gas storage
- Fuel cell
- 2 multimeters with connectors

Proprietary – Burlington County College use only

- Load module with electric motor and light bulb
- Variable resistor module
- Flexible connecting cords; brass, hard copper, gold plated contacts
- Connecting tubes and end caps
- Distilled water
- Syringe

CAPABILITIES:

- Measuring volume ratios of generated gases
- Measuring volumes of gases per unit of time at different electrical currents
- Determination of power efficiency and Farady efficiency of the electrolyzer
- Determination of electrolyzer characteristics (U/I)
- Determination of power efficiency and Farady efficiency of the fuel cell
- Determination of fuel cell characteristics (U/I)
- Operation of electrolyzer with solar cells (Requires AE 101 Solar Energy Trainer)
- Operation of electrolyzer with wind energy (Requires AE 103 Wind Energy Trainer)
- Operation of electrolyzer with solar cells and wind energy as a hybrid system (Requires AE 101 and AE 103)

MANUALS / SOFTWARE:

EXPERIMENTS ON HYDROGEN TECHNOLOGY (INSTRUCTION INCLUDED)
EXPERIMENTS ON HYDROGEN TECHNOLOGY (SOLUTIONS INDCLUDED)

Proprietary – Burlington County College use only

10.2 Solar Concepts Learning System

<table>
<tr><td rowspan="3"> </td><td>CATEGORY:
Alternative Energy</td></tr>
<tr><td>MANUFACTURER:
Amatrol</td></tr>
<tr><td>MODEL:
950-SC1</td></tr>
<tr><td colspan="2">MANUFACTURER PRODUCT PAGE:
http://www.amatrol.com/coursepage/950-sc1/</td></tr>
<tr><td colspan="2">Comments: Solar PV & Thermal basics; Multi-media, PC-based; Includes 5 interactive multi-media curriculum modules.
• Solar Concepts DVD – Maintained by OIT
• Instructor's Guide – On reserve; Multiple copies; Ask at front desk, Pemberton library</td></tr>
</table>

Current Class Utilization	
Number:	Course Name
SST-111	Alternative Energy Sources

DESCRIPTION: Solar energy is being used in a broad range of applications across industry and residences alike. From heating water for home use to creating utility scale electricity – solar energy application is growing. Understanding the basics of how we can harness solar energy is essential for technicians, engineers, installers, designers, builders, and others who want to apply solar technology either professionally or personally.

Amatrol's 950-SC1 Solar Concepts Learning System introduces students to a broad range of basic concepts in solar energy and technology. Photovoltaic and thermal solar systems are introduced to students. They learn how to translate location, sun, and technology into practical applications. The 950-SC1 acts as a foundation for students in solar technology. Solar Concepts includes student curriculum in PC based, interactive multimedia format as well as an instructor's assessment guide.

Interactive, Engaging Multimedia

Amatrol's interactive multimedia provides an engaging, stimulating experience for students. The Solar Concepts Learning System includes interactive computer-based instruction with both

theory and hands-on tutorials consisting of text, digital video, voice, online self-review tests, interactive simulations, color diagrams and color photos. Amatrol's strong interactive multimedia includes visual, auditory, and text based learning styles to reinforce each other in well organized learning segments.

Using Solar Technology to Capture Solar Energy -Location Makes a Difference!

Siting a solar array or understanding how much energy you can capture from an array in a specific location requires background provided by Amatrol's Solar Concepts. The type of application also plays a strong role. With the 950-SC1, students learn how to site an array with optimum orientation as well as determine the insolation, which varies significantly from place to place.

Optional 95-SIP1 Solar Instruments Package

The 950-SC1 Solar Concepts Learning System teaches students to use a variety of instruments required to apply solar technology. These virtually developed skills can be reinforced with hands-on application through the optional 95-SIP1 Solar Instruments Package (not currently purchased by BCC).. The package contains a pyranometer, global positioning system (GPS), inclinometer and compass. Students will learn how to translate their virtual skills to the actual instruments and apply them to solar technology systems. All of these are required to properly orient arrays.

LEARNING TOPICS:

- Insolation Data
- Array Orientation
- Sun Path
- Solar Time
- Global Positioning
- Peak Sun
- Solar Irradiance
- Space Heating & Cooling
- Passive & Active Water Heating
- Solar Industry
- AC & DC Photovoltaic Systems
- Solar Energy Systems

MANUALS:

- Instructor's Guide for 950-SC1 Solar Concepts Learning System (Pemberton Library)

10.3 Solar Thermal Collector System

<table>
<tr><td> </td><td>CATEGORY:
Alternative Energy</td></tr>
<tr><td></td><td>MANUFACTURER:
US Didactic</td></tr>
<tr><td></td><td>MODEL:
HL 313</td></tr>
<tr><td colspan="2">MANUFACTURER PRODUCT PAGE:
http://www.usdidactic.com/html/educational_solar_energy_colle.html</td></tr>
<tr><td colspan="2">Comments:</td></tr>
</table>

Current Class Utilization	
Number:	Course Name
SST 216	Solar Thermal Systems

DESCRIPTION: In this system a flat plate collector transmits the radiated heat of the sun to a heat transfer medium. The energy is transferred to a hot water circuit in a heat exchanger. A differential temperature controller with thermostat keeps the hot water temperature in the reservoir constant. The solar circuit is protected with an expansion vessel and a safety valve. This system is built using commercially available components. For adequate performance the system should be operated with direct irradiation by the sun.

CAPABILITIES:

- Familiarization with a solar circuit
- Function of a solar collector using the absorption principle
- Measurement of temperature distribution
- Collector efficiency
- Net power output of the system

MANUALS / SOFTWARE: HL 313 Solar-powered Service Water Plant : Experiment Instructions / Frank Jebavy (Pemberton Campus Library)

Proprietary – Burlington County College use only

10.4 Solar Thermal Collection and Storage Trainer

CATEGORY:
Alternative Energy

MANUFACTURER:
Sundog Solar

MODEL:
Rover

MANUFACTURER PRODUCT PAGE:
http://www.sundogsolar.net/rover.html

Comments:

Current Class Utilization	
Number	Course Name:
SST 216	Solar Thermal Systems

DESCRIPTION: The Rover is a unique miniaturized mobile see-through solar thermal demonstration unit that contains a functional pressurized closed loop and an un-pressurized drainback/double pumped drainback loop. This unit demonstrates both flat plate and evacuated tube collectors. Pumps are operated by a digital controller for the pressurized loop, and by an analog controller for the non-pressurized loop.

CAPABILITIES:
The unique design of the Rover include clear tanks and tubing which allow students to see what is inside the tanks and pipes. This allows the student to observe the actual movement of the heat exchange fluids through the system. The Rover fits through a 32-inch door and designed so that the solar collectors fold down for easy storage and transport.

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All collectors, loops, controls, sensors, expansion tank, heat exchange coils, and thermometers are fully functioning. The Rover runs on 110 volt power and can be operated outdoors to collect sunlight or indoors with a heat lamp.

Included with each Rover is a handbook that explains how the unit functions and exercises that teachers can build into their classroom curriculum to demonstrate the various design principles of solar thermal systems.

The Rover allows students to see a working demonstration of how solar thermal energy is stored and collected. To demonstrate how that energy is distributed, a companion trainer (the Pup) was developed. The Rover and the Pup interconnect to provide a complete solar thermal educational experience.

MANUALS / SOFTWARE:

The Solar Rover Quick-start Handbook / Solaqua (Pemberton Library; Instructor reserve, behind main desk)

Proprietary – Burlington County College use only

10.5 Solar Thermal Loads Trainer

CATEGORY:
Alternative Energy

MANUFACTURER:
Sundog Solar

MODEL:
Pup

MANUFACTURER PRODUCT PAGE:
http://www.sundogsolar.net/pup.html

Comments:

Current Class Utilization	
Number	Course Name:
SST 216	Solar Thermal Systems

DESCRIPTION: Designed to work with the Sundog solar thermal collection and storage trainer, the Rover, the Pup features the common solar thermal loads — a radiant floor, fan coil and domestic hot water tank.

CAPABILITIES:
The fan assisted heating coil illustrates space heating or heat dumping and diversion of heated liquid facilitated by a 3-way zone valve. The DHW tank features an anti-scald valve, three valve bypass and 220 volt electric heating elements, all of which are conditions solar installers encounter in the field.

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An automatic three way motorized mixing valve with sensors illustrates how installers can facilitate heat dump or load shifting. Interconnecting hoses with quick disconnects between the Pup and the Solar Rover allow solar heated water to flow between the two trainers, and temperature gauges allow the students to monitor temperature changes. All of the thermal load elements are easily drained for long term storage.

In addition to the solar load elements, the Pup features shingles and standing seam steel roof sections. This allows the demonstration of roof penetration sealing methods and panel mounting approaches. Several different types of panel mounts and waterproof penetration devices are included with each trainer.

MANUALS / SOFTWARE:

The Solar Rover Quick-start Handbook / Solaqua (Pemberton Library; Instructor reserve, behind main desk)

The SunDog Rover and Pup create a complete solar thermal educational experience.

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10.6 Solar Thermal Closed-Loop Troubleshooting Learning System

CATEGORY:
Alternative Energy

MANUFACTURER:
Amatrol

MODEL:
950-STCL1

MANUFACTURER PRODUCT PAGE:
http://www.amatrol.com/950-stcl1/

Comments:

Current Class Utilization	
Number	Course Name:
SST 216	Solar Thermal Systems

DESCRIPTION: Amatrol's 950-STCL1 Solar Thermal Closed-Loop Troubleshooting Learning System(shown with optional sun simulator attached) allows students to develop the specialized skills and knowledge needed for working with the two common types of thermal closed-loop systems: drainback and pressurized. The 950-STCL1 teaches students connection, operation, programming, and troubleshooting of both drainback and pressurized systems. The curriculum is PC-based multimedia that is highly interactive. It allows students to use the learning style best for them– reading, listening, or visual. The 950-STCL1 supports the NABCEP (North American Board of Certified Energy Practitioners) test for Certified Solar Thermal System Installer.

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CAPABILITIES:

The 950-STCL1 includes all components needed to develop hands on, job-ready skills: all solar specific components as well as balance of system items. The learning system contains a mobile workstation, multiple component circuit panels, two solar collectors, fault insertion, PC-based multimedia student curriculum, and instructor's assessment guide. A sun simulator facilitates classes indoors when outdoor conditions do not support solar heating.

Key Features

- Two Types of Closed-Loop Thermal Systems
- Replicates Real World Thermal Systems
- Fault Insertion for Both Electrical and Fluid Systems
- Balance of System Components

Fault Insertion For Both Electrical and Fluid Systems

At the heart of a technician's skill set is the ability to troubleshoot a system. The 950-STCL1 is equipped with a wide array of both electrical and fluid faults that allow instructors to replicate realistic system and component failures. Students will learn to independently solve the many common types of situations they will encounter on the job.

Balance of System Components – Replicates Real World Thermal Systems

Developing installation and troubleshooting skills for solar thermal systems requires all the components commonly found in these systems. Elements such as vacation bypass, check valves, relief valves, flow meters, and tempering valves are essential to create realistic systems and troubleshooting situations. Amatrol also includes a digital differential controller that features many programming capabilities which allow students to learn how to program the more sophisticated thermal systems they are likely to encounter.

Two Types of Closed-Loop Thermal Systems

Solar technicians will encounter both drainback and pressurized closed loop solar thermal systems. Across any given region that experiences freezing conditions, both of these systems are used extensively. Amatrol includes the components needed to configure either system, including both an expansion tank and drainback tank. Students can switch between the two systems with valving.

Sun Simulator (95-STS1)

The sun simulator, 95-STS1, is for use indoors with the 950-STCL1. The Solar Thermal Closed-Loop Learning System's two thermal collectors work either outside with direct sunlight or inside with the sun simulator.

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MANUALS:

- Instructor's Guide - Amatrol 950-STCL1 Solar Thermal Closed Loop Troubleshooting Learning System (To be transferred to Pemberton Library; Instructor Reserve, behind main desk)
- Installation Guide - Amatrol 950-STCL1 Solar Thermal Closed Loop Troubleshooting Learning System (To be transferred to Pemberton Library; Instructor Reserve, behind main desk)

Proprietary – Burlington County College use only

10.7 Basic Wind Energy Trainer

	CATEGORY: **Alternative Energy**
	MANUFACTURER: **US Didactic**
	MODEL: **AE 103**
MANUFACTURER PRODUCT PAGE: http://www.usdidactic.com/html/alternative_energy_educational.html	
Comments:	

Current Class Utilization		
Subject:	Course Number:	

DESCRIPTION: The wind power plant generator (turbine) can be setup with different blade configurations, and the source of airflow is adjustable.

Equipment:

- White suitcase with foam cutouts to store and protect equipment
- Experiment platform with mounting for modules and multimeters
- Wind source with variable power output
- Wind power plant with axial rotor, generator without gear, tacho-generator, hub for mounting 2 / 3 / 4 blades, and adjustable blade angles
- 4 even blades, 4 curved blades
- Protective cover, wind shield, assembly tool
- 2 multimeters with connectors
- Anemometer
- Load box with electric motor and light bulb
- Storage box with NC accumulator, GoldCap and blocking diode
- Measuring box with variable resistor
- Experiments manual

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CAPABILITIES:

- Measuring wind force outdoors
- Measuring wind force on the experiment platform
- Power output of the generator with different blade shapes
- Power output of the generator with different numbers of blades (2,3,4)
- Power output of the generator with different blade angles
- Characteristic curve of a generator (U/I) at constant speed
- Characteristic curve of a generator (U/I) at varying speeds
- Measuring the resistance-and buoyancy rotor at constant wind force
- Power output of the generator at different wind speeds
- Charging an accumulator/Gold Cap with the generator
- Discharging the accumulator/Gold Cap with different loads

MANUALS / SOFTWARE:

- EXPERIMENTS ON WIND ENERGY (INSTRUCTION INCLUDED)
- EXPERIMENTS ON WIND ENERGY (SOLUTIONS INDCLUDED)

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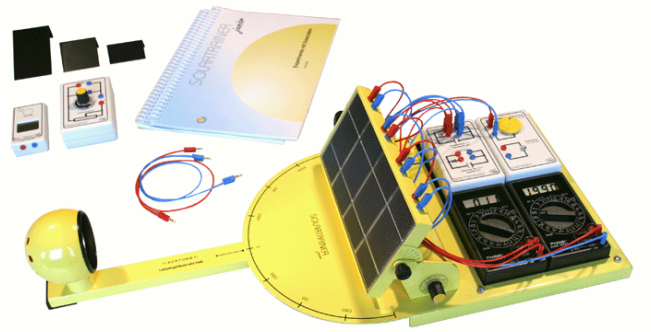
10.8 Basic Solar Energy Trainer – Photovoltaic Experiments



CATEGORY:
Alterntive Energy

MANUFACTURER:
US Didactic

MODEL:
AE 101

MANUFACTURER PRODUCT PAGE:
http://www.usdidactic.com/html/alternative_energy_educational.html

Comments:

Current Class Utilization		
Subject:	Course Number:	

DESCRIPTION: A collection of photovoltaic cells, circuit modules, and instrumentation with an experimental platform suitable for classroom demonstrations and student experiments.

Equipment:

- Custom yellow suitcase with protective foam cutouts
- Base board with inserts for circuit modules & multi-meters
- Low voltage (12 V) halogen lamp
- Power supply with dimmer switch and power cable
- Solar module with 4 single cells and angle adjustment
- 2 multimeters with connectors
- Sensor box for measuring irradiance
- Load box with electric motor and light bulb
- Storage box with NC accumulator with GoldCap and blocking diode
- Measuring box with variable resistor
- Flexible connecting cords; brass contacts / hard copper gold plated

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CAPABILITIES:

- Measuring irradiance of different light sources
- Solar cell as a energy converter
- Solar cell as a energy converter and diode function
- Open circuit voltage of a solar cell at different shadowing conditions
- Short circuit current of a solar cell at different shadowing conditions
- Open circuit voltage and short circuit current of a solar cell at different levels of irradiance
- Short circuit current of a solar cell at multiple angles of incidence
- Series connection of solar cells / different shadowing condition
- Parallel connection of solar cells / different shadowing conditions
- Characteristic curve of a solar cell (I/U) / different levels of irradiance
- Characteristic curve of a solar cell (U/P), MPP, determination of efficiency
- Simulation: Short circuit current of a solar cell based on position of the sun (sunrise to sunset)
- Charging a GoldCap (energy storage) / accumulator with solar cells
- Discharging a GoldCap (energy storage) / accumulator with electric motor and light bulb

MANUALS / SOFTWARE:

- EXPERIMENTS ON SOLAR ENERGY (INSTRUCTION INCLUDED)
- EXPERIMENTS ON SOLAR ENERGY (SOLUTIONS INDCLUDED)

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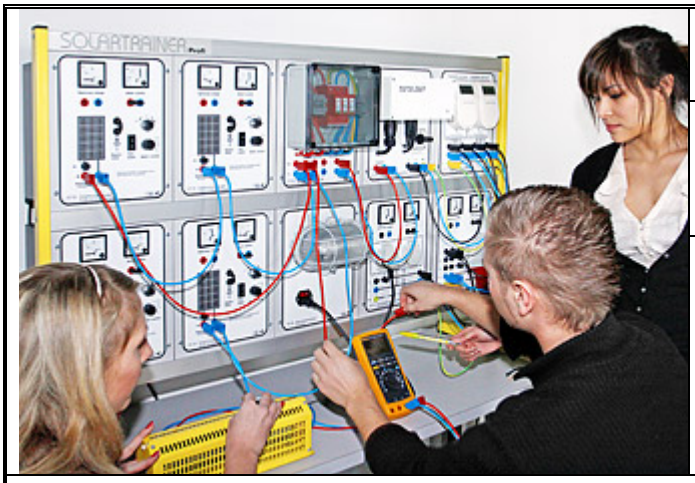
10.9 Fundamentals of Solar PV Training System



CATEGORY:
Alternative Energy

MANUFACTURER:
US Didactic

MODEL:
Modular PROFI PV Trainer

MANUFACTURER PRODUCT PAGE:
http://www.usdidactic.com/

Comments: (*) – ST1 – ST98 – Included

Data Sheet (pdf)
http://www.usdidactic.com/refpdf/US%20Didactic%20PROFI%20PV%20Photovoltaic%20Trainer.pdf

Current Class Utilization	
Number	Course Name
SST 211	Solar PV Systems I – Theory and Design

DESCRIPTION: The PROFI PV Trainer system consists of a collection of modules, each with components for different experimental configurations. The modular panels are placed in the frame and wired with patch cords, as required. The system design enables indoor and outdoor experiments. Indoor exercises are carried out with the mobile PV-Module/Light stand:

The halogen lamp 500 W (mains connection 230 V AC) with dimmer switch is vertical as well as horizontal movable fixed to an outrigger and irridiates the PV-module. Adjustable angle of inclination of the PV-module. PV-module Pmax = 10 W, monocrystalline. Stand with 4 rolls with stop-function

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PV-Module/Light stand

The intensity of the spotlight can be adjusted, while vertical and horizontal angles are modified to simulate seasonal daily curves of the sun. Determination of the characteristic curve for the PV-module also includes influence of slope angle and simulated irradiation & temperature. Short circuit current can be adjusted.

CAPABILITIES/Partial List of Exercises:

- Power output of a solar module depending on the angle of incidence of the light
- Simulation: Power output of a solar module depending on the position of the sun (daily & seasonal)
- Parallel connection of solar modules
- Series connection of solar modules and shadowing with bypass-diode
- Line powered operation mode: solar energy is fed via inverter to the local power grid
- Calculation of efficiency (inverter)
- Stand alone systems DC and AC.
- Solar charging controller, battery, stand-alone inverter,
- DC and AC loads.
- Different constellations of power flowing in the system
- Integration of outdoor solar module
- Data Acquisition

MANUALS / SOFTWARE:

- PROFI SOLAR TRAINER INSTRUCTION MANUAL - Instructions for all components (Pemberton Campus Library; Instructor reserve, behind main desk)
- PROFI SOLAR TRAINER EXPERIMENTAL INSTRUCTIONS (STUDENT LABORATORY MANUAL) - Detailed experimental instructions on 12 themes, with solutions (Pemberton Campus Library).

Proprietary – Burlington County College use only

10.10 Solar & Wind Training System

CATEGORY:
Alternative Energy

MANUFACTURER:
Amatrol

MODEL:
850-AEC Alternative Energy Learning System – Wind and Solar

MANUFACTURER PRODUCT PAGE:
http://www.amatrol.com/coursepage/850-aec/

Comments: Solar PV panels and a simulated solar source flip-up from rear of trainer.
Curriculum: Trainer comes with interactive multimedia student curriculum
Location: Curriculum DVD is maintained by OIT, Parker Center Room 403A.

Current Class Utilization	
Number	Course Name
SST 211	Solar PV Systems I – Theory and Design
SST-226	Small Wind Systems

DESCRIPTION: The 850-AEC Alternative Energy Learning System teaches students key skills needed for job success in small wind and solar. Students will learn hands-on skills they can use on the job. Critical skill areas covered are system connection, operation, and programming of solar PV (photovoltaic) and small wind systems in commercial and residential applications.

The Amatrol Alternative Energy Learning System – Wind and Solar includes:

- a mobile workstation with
  - solar PV components
  - small wind components
- multimedia student curriculum
- teacher's assessment guide

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The mobile workstation is equipped with pre-mounted components for easy inventory. Wind turbine and solar panels also allow for outside use with expansion capability for teaching grid-tie and data acquisition.

Convenient Indoor / Outdoor Use
The Amatrol 850-AEC Learning System's wind and solar circuits can be used indoors with sun and wind simulators, or outdoors via the detachable solar panel array or client-supplied external wind and solar sources. The solar array easily disconnects from the workstation and sets up outdoors. The 850 Learning System can also be connected to client-supplied roof-top solar panels or wind turbines with the addition of optional interface connections.

Real World Components: Multiple Panel Array and Modern Communications
Real world components commonly found in commercial and residential environments to help make learners job ready are showcased in the 850-AEC. For example, the 850 is equipped with a combiner box and a multiple panel solar array, allowing learners to connect panels in series and parallel. The MPPT charge controller, which is the most common controller used today, allows programming and communications via Ethernet from an LCD panel that are typical of current practices. The 400W wind turbine and diversion load controller are commonly found in small wind applications.

Interactive Multimedia Curriculum
Interactive, multimedia curriculum is included with the 850-AEC that enables it to support self-paced student learning or a traditional class setting as a presentation tool. The interactive, multimedia curriculum uses a competency-based instructional design that teaches industry standard skills. Eye popping graphics, 3D animations, video, audio and complete text explanations combine with strong interactivity to engage students and appeal to a variety of learning styles.

Grid Interactive and Data Acquisition Options
Amatrol's 850-AEC Learning System for wind and solar offers a number of options that can greatly expand the capability of the system. The 85-GT1 Grid-Tie Learning System – Solar features a single phase inverter that enables the system to connect to the classroom grid, typical of PV systems being installed today.

The 85-ADA1 Data Acquisition Learning System – Wind and Solar features a multi-point data acquisition module, PC software, and sensors that monitor voltage and current in various parts of both wind and solar circuits, enabling students to study operation via data analysis. Both options are panel-mounted units that easily add to the 850 workstation.

LEARNING TOPICS:

- Safety
- Solar Panel Operation
- Solar Panel Performance
- PV Array Connection
- Wind Turbine Operation

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- Wind Turbine Performance
- Wind Turbine Connection
- Solar/Wind Batteries
- Charge Controllers
- Inverters
- Balance of System Components
- AC/DC Solar Systems
- AC/DC Wind Systems
- Energy Conservation and Demand
- System Performance

MANUALS / SOFTWARE:

10 Installation guide for 850-AEC alternative energy learning system / Amatrol. [Reserve]

11 Instructor's guide for 850-AEC alternative energy learning system / Amatrol. [Reserve]

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10.11 Wind Energy Training System

	CATEGORY: **Alternative Energy**
	MANUFACTURER: **Lab Volt**
	MODEL: **46120 Wind/Solar Trainer** **Note:** Only the **Wind Energy-related** components of the Lab Volt Model 46120 Wind/Solar trainer were purchased.
MANUFACTURER PRODUCT PAGE: http://www.labvolt.com/products/alternative-and-renewable-energy/solarwind-energy/solarwind-energy-training-system	
Comments: Only the **Wind Energy-related** components of the Lab Volt Model 46120 Wind/Solar trainer were purchased. **Also see:** Catalog item **"**Solar & Wind – Grid Tied Systems Simulation Software"	

Current Class Utilization	
Number	Course Name:
SST 226	Small Wind Systems

DESCRIPTION: The Solar/Wind Energy Training System forms a complete hybrid energy training system (Note: See "Comments" box above). This program demonstrates how wind turbines and solar cells are being used in the consumer and industrial markets to supplement the world's power needs. The trainer is made with real-world components that are used in industry; the same components that students will see in their own homes, schools, or workplace.

In the Lab Volt Solar/Wind Energy curriculum, students will learn about how solar and wind energies are converted, transmitted, and stored. The lesson plan includes an Instructor Guide that provides information for the installation, configuration, and operation of the trainer. It also includes learning outcomes, testing and evaluation procedures, answer keys, student skills response, inventory list, and print CD.

SOLAR/WIND ENERGY TRAINING SYSTEM/ Includes:

• 85W Photovoltaic Solar Module
• 400W Wind Turbine Generator
• 50A Stop Switch
• 30A PWM Solar Charge Controller
• 35A Diversion Load Controller
• 600W Resistive Dump Load
• Digital Multimeter (DMM)
• Power/Usage Monitor
• Three Analog 30A DC Ammeters
• Two 120V AC Watt-Hour (kWh) Meters
• Battery: 12V DC, 110Ah Sealed Lead-Acid AGM Storage Battery
• 1kW DC-to-AC Sinusoidal Power Inverter
• Four Battery Disconnect Switches with Keys
• Lockout/Tagout Module with Hasp
• 120V AC Circuit Breaker Box with Two 30A and
Two 15A Resettable Circuit Breakers
• Three 12V DC, 50A Circuit Breakers
• Three 120V AC/12V DC, 15A Duplex Outlets
• 120V AC, 15A Duplex Outlet
• Four 120V AC/12V DC, 15A Wall Switches
• Four Light Socket Adapters
• 120V AC Incandescent, Fluorescent, and LED Lamps
• 12V DC Incandescent, Fluorescent, and LED
Lamps
• 12V DC Power Bus Bar
• 12V DC Power Distribution Panel
• 90V DC Motor and Controller (Wind Simulator)
• 120V AC Flood Lamp (Sun Simulator)

SOLAR WIND CURRICULUM / Topic Coverage

Energy Fundamentals
• Sources of Energy
• Power and Work
• Measurements and Units
Trainer Familiarization and Safety
• Trainer Components
• Safety Practices
• Lockout/Tagout Procedure
• Proper Grounding
• Equipment Protection
Solar Module
• Siting
• Photovoltaic Module
• Charge Controller
• Loading
• Battery Bank
Wind Turbine
• Siting
• Turbine Generator
• Stop Switch
• Loading
• Battery Bank
Solar/Wind Systems
• Diversion Load and Controller
• DC to AC Inverter
• Power Consumption
• Power Efficiency
• Power Transmission and Distribution
• On/Off Grid Operation
• Hybrid Generator
• Troubleshooting
Going Green
• Solar Energy History
• Wind Energy History
• Solar/Wind Industry Careers

MANUALS / SOFTWARE:

Pemberton Campus Library -

- Solar/wind energy training system : solar/wind systems; job sheets--instructor / Lab-Volt
- Solar/wind energy training system : solar/wind systems; job sheets--student / Lab-Volt.

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10.12 Solar & Wind – Grid Tied Systems Simulation Software

CATEGORY:
Alternative Energy

MANUFACTURER:
Lab Volt

MODEL:
46120-AO

MANUFACTURER PRODUCT PAGE:
http://www.labvolt.com/downloads/download/Grid-Tied%20Systems%20Rev.%20B_LR.pdf

Comments: This software is an add-on to the Lab Volt Model 46120 Wind/Solar Trainer (see item "Wind Energy Training System" in this catalog).
Terms of use: Unlimited site license; **Location:** CD ROM Maintained by OIT.
Courseware: Pemberton Campus Library

- **Student Manual** Solar/wind energy training system : grid-tied systems; job sheets--student / Lab-Volt
- **Instructor Guide** Solar/wind energy training system : grid-tied systems; job sheets--instructor / Lab-Volt.
- **Software** Solar / wind energy training system [CD-ROM] : Grid-tied systems simulation / Lab-Volt.

Current Class Utilization	
Number	Course Name:
SST 212	Solar PV Systems II – Construction and Troubleshooting
SST 226	Small Wind Systems

DESCRIPTION: Lab-Volt Systems, Inc. has developed a comprehensive Grid-Tied Systems Simulation Software add-on to their Solar/Wind Energy Training System, Model 46120.

The electric utility grid is a large-scale power system that is maintained by electric utility companies across the United States. Alternative energy systems that convert solar or wind power to electricity can supply electric power to the utility grid. Grid-tied systems generate electricity

and send this energy back to the utility company's power grid. The energy produced counts against the energy your home or business uses, thereby offsetting your utility usage.

Lab-Volt's Grid-Tied Systems uses computer software to simulate the installation and operation of a utility-interactive photovoltaic (PV) solar energy system in a residential home. The software is comprised of an Electrical Wiring Simulator and a Home Energy Simulator and includes Student and Instructor Manuals.

TOPICS:

Grid Connected Equipment

- Commercial String Inverters
- Installing a Grid-Tied Photovoltaic Solar Power System
- Wiring and Configuring Alternative Energy Systems

Utility-Interactive Software

- Smart-Grid Technology
- Remote Data Acquisition
- Power Management Techniques

The NEC

- The NEC Code as it Applies to Alternative Energy Installation in the U.S.
- Installation Requirements for Solar and Wind Power Systems in the Continental U.S. and its Territories

DETAILS:

Lab-Volt's Solar/Wind Energy Training System, Model 46120-00, forms a complete hybrid energy-training system through which students explore the collection, storage, and conversion to electricity of solar and wind energy. The Grid-Tied Systems Simulation Software Add-on, Model 46120-A0, expands on that knowledge and enables students to simulate the connection of the converted energy to the public utility grid.

The courseware for each of the topics consists of a student manual and an instructor guide, as well as textbooks titled Photovoltaic Systems, written by Jim Dunlop and NFPA 70: National Electrical Code (NEC 2008). Each Student Manual consists of a series of job sheets. The job sheets include a description of the objectives and a list of steps required to attain the objectives. All student manuals and instructor guides, as well as the textbooks, are fully illustrated and color printed.

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Students observe the operation of a grid-tied photovoltaic solar power system in a residential home. They are able to control and observe how the effects of various weather conditions and equipment parameters can impact the alternative energy produced by this electrical system.

Students also witness the energy consumption or loading effects of typical household appliances and lighting to see how lifestyle changes can impact energy conservation. The use of renewable and sustainable radiant energy from the sun also allows students to calculate carbon offsets or greenhouse gas credits that may be applicable.

MANUALS / SOFTWARE:

Pemberton Campus Library -

- Solar / wind energy training system [CD-ROM]: Grid-tied systems simulation / Lab-Volt.
- Solar/wind energy training system: grid-tied systems; job sheets--instructor/ Lab-Volt [Reserve]
- Solar/wind energy training system: grid-tied systems; job sheets--student / Lab-Volt.

11.13 *Solar PV Troubleshooting Learning System*

<table>
<tr><td> </td><td>CATEGORY:
Alternative Energy</td></tr>
<tr><td></td><td>MANUFACTURER:
Amatrol</td></tr>
<tr><td></td><td>MODEL:
950-SPT1 (with Required 95-SPA1 Solar PV Array Station)</td></tr>
<tr><td colspan="2">MANUFACTURER PRODUCT PAGE:
http://www.amatrol.com/950-spt1/</td></tr>
<tr><td colspan="2">Comments:</td></tr>
</table>

Current Class Utilization	
Number	Course Name:
SST 212	Solar PV Systems II – Construction and Troubleshooting

DESCRIPTION: Installing and maintaining solar photovoltaic (PV) systems requires hands-on skills and troubleshooting ability across the types of PV systems commonly used such as AC, DC, and grid-connected. Budding engineers and designers need to understand the technologies used in these systems as well.

Key Features

- Grid-Connected and Micro Inverters
- Modern Communications and Programming
- Balance of System Components - Replicates Real World PV Systems
- Computerized Fault Insertion
- Mobile, Multiple PV Pane

Learning Topics

- Module Operation
- PV Module Performance
- PV Array Connection
- Solar Batteries
- DC Solar PV Systems
- Charge Controllers
- AC Solar PV Systems
- PV Inverters
- Grid-Connected Systems
- Energy Conservation & Demand
- Solar PV System & Component Sizing
- Solar PV System Performance
- Troubleshooting Components
- System Troubleshooting
- PV Maintenance

CAPABILITIES:

Amatrol's 950-SPT1 Solar Photovoltaic Troubleshooting Learning System allows students to develop the specialized skills and knowledge needed for working with the common types of PV systems. The 950-SPT1 teaches students connection, operation, programming, and troubleshooting of AC/DC and grid-connected systems. The curriculum is PC-based multimedia that is highly interactive. It allows students to use the learning style best for them – reading, listening, visual. The 950-SPT1 supports the NABCEP (North American Board of Certified Energy Practitioners) test for Certified Solar Photovoltaic System Installer.

The 950-SPT1 includes all components needed to develop hands-on, job-ready skills: all solar specific components as well as balance of system items. The learning system contains a mobile workstation, component panels with breakers, combiner box, MPPT charge controller, lamps, batteries, meters, grid-connected inverter, a fault insertion system, PC based multimedia student curriculum, and instructor's assessment guide. The required 95- SPA1 two-panel array provides a complete solar PV troubleshooting experience.

Computerized Fault Insertion

At the heart of a technician's skill set is the ability to troubleshoot a system. The 950-SPT1 is equipped with a wide array of electrical faults that allow instructors to replicate realistic system and component failures. For the 950-SPT1, Amatrol uses electronic fault insertion so that instructors can easily insert faults and track the student's troubleshooting results. Electric fault insertion prevents component damage while allowing instructors to see student progress. Instructors can identify specific areas the student needs to improve and target those areas. It also allows instructors to set-up faults ahead of time, allowing students to perform self-directed study when appropriate.

Balance of System Components – Replicates Real World PV System

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Developing installation and troubleshooting skills for PV systems requires all the components commonly found in these systems. Elements included on the 950-SPT1 such as power distribution panels, a combiner box, disconnects, and circuit breakers are essential to create realistic systems and troubleshooting situations.

Grid-Connected and Micro Inverters

Solar applications are increasingly including grid-connected capability. In fact, of PV system being purchased today. This is a key component that allows maximum economic return - owners can sell excess power to the utility. Likewise, when solar power is not sufficient, additional power is often needed from the electrical grid. Amatrol's 950-SPT1 includes a micro inverter in addition to the grid-tie inverter. This is also a very popular option that is frequently used to assign an inverter to each PV string. Both of these inverters are required to teach skills across all major types of AC systems including stand-alone AC, grid-connected AC, and grid-connected AC with storage.

Modern Communications and Programming

Modern solar technology installations frequently include network communications. The inverters and charge controller on Amatrol's Solar PV Troubleshooting enable students to learn how to network system components. Students also learn how to troubleshoot at the system level as well. The inverter and charge controller feature many modern programming capabilities which allow students to learn how to program the more sophisticated systems they are likely to encounter.

Mobile, Multiple PV Panels

Required 95-SPA1 Solar PV Array Station

The required PV array for the 950-SPT1contains multiple panels so that students can learn to connect a realistic array. Most solar technology applications have multiple panels. Students need

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to learn about the effects of series and parallel connections, which require more than one panel. Additionally, the 95-SPA1 Solar PV Array Station is mobile, allowing instructors to take advantage of sunny days without having to move the entire trainer. The array is equipped with sun simulation as well to enable indoor use.

MANUALS / SOFTWARE:

- Amatrol 950-SPT1 Solar Photovoltaic Troubleshooting Courseware (Original CD is maintained by OIT; under the licensing agreement, the software may be activated on only one computer at a time).

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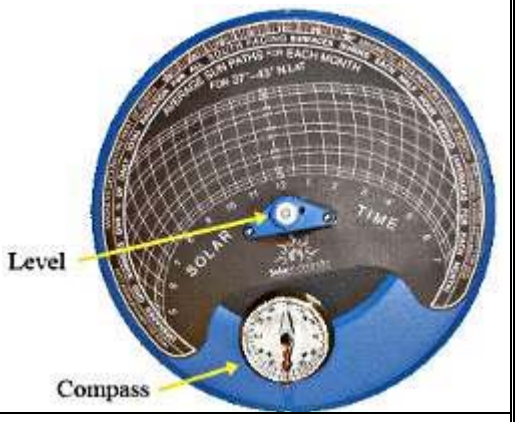
11.14 Sun Path Shading Analyzer

<table>
<tr><td> </td><td>CATEGORY:
Alternative Energy</td></tr>
<tr><td rowspan="2"></td><td>MANUFACTURER:
The Solar Pathfinder Company</td></tr>
<tr><td>MODEL:
Solar Pathfinder
 
</td></tr>
<tr><td colspan="2">MANUFACTURER PRODUCT PAGE:
http://www.solarpathfinder.com/PF</td></tr>
<tr><td colspan="2">Comments: Video http://www.solarpathfinder.com/video/2?autostart=1

Additional purchased items: PV Studio Software and Thermal Assistant Software</td></tr>
</table>

Current Class Utilization	
Number	Course Name:
SST 211	Solar PV Systems I – Theory and Design
SST 216	Solar Thermal Systems

DESCRIPTION: By combining the site-specific shading data of the Solar Pathfinder™ with the published global weather data, an accurate solar site analysis can be made. This insolation data, on an hourly and monthly basis can then be applied to architectural, engineering, solar, and ecological applications. All of this data is integrated in the Solar Pathfinder Assistant software,

MANUALS / SOFTWARE:

PV Studio Software

The new *PV Studio* design software from The Solar Pathfinder Company is a valuable tool for installers. This program will allow the installers to minimize the time involved in designing a

system and maximize the output production of their system. With this program the user can design the shape of the roof, select their inverters and panels, and arrange the panels all on one page.

At the job site, instead of walking around on the roof to determine the best location for the panels to be placed, simply take a photo at every corner of the roof. Once these photos have been loaded into the software, the user will be able to see a heat map displayed. This will let the user know the shading percentages for each location on the roof, and therefore determine which location would provide the maximum output for the array.

Another feature in *PV Studio* allows you to copy your original design and make changes such as the tilt angle, panel orientation, or even the location and number of panels. The Energy Production box will show the projected output per month and annual production totals for both the original and modified design.

Thermal Assistant Software

Any scientific analysis requires accurate input and careful calculations. The Solar Pathfinder and Assistant provide mathematical precision for accurate shading assessment (solar site analysis) by eliminating gross errors in structure orientation, solar system sizing, and PV/collector placement. The Solar Pathfinder Assistant software dovetails local weather data (using NREL/WMO) and site-specific shade analysis in a customizable report. Originally furnished for the ecological and photovoltaic applications, the Assistant software now services the growing thermal technologies.

The Thermal Assistant allows the user to input all the necessary information in order to determine the potential hot water supply for their system such as tilt angle of collectors, collector orientation, daily hot water load per month, tank size, tank temperature and supply water temperature. After this information is added and a Pathfinder photo is loaded and traced, the software will provide the data necessary to evaluate this particular installation.

Thermal Assistant Features:

- Computes monthly sun paths for specific latitude
- Contains World weather data (WMO/NREL)
- Enhanced exports capabilities (.pdf, .csv, jpg, etc.)
- Imports into other software
- Distance shading model which allows readings from ground level
- Maintains Report Health Diagnostics
- Uses English or Metric Units
- Generates fully customizable reports (use your business name/logo, etc)
- Actual solar radiation with & without shading (kW/m2/day)
- Contains list of 240 solar hot water collectors (SRCC data) (drops in net aperture area, efficiency curve Y intercept, efficiency curve slope (thermal conductance)
- Allows for input of specs for solar hot water collectors not listed
- Uses F-chart calculations
- Allows for specifying deciduous trees

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10.15 Solar PV Installation Training Roof

CATEGORY:
Alternative Energy

MANUFACTURER:
BCC Facilities Department

Comments: Students completed the above installation in the spring 2013 semester at the conclusion of course SST 212 Solar PV System II – Construction and Troubleshooting. The simulated roof is located on the Pemberton East Campus. See more pictures on next page.

Current Class Utilization	
Number	Course Name:
SST 212	Solar PV Systems II– Construction and Troubleshooting

DESCRIPTION: BCC has constructed a simulated roof (15 degree pitch) at ground level in order to provide realistic training to students for solar PV installations. Appropriate solar equipment and tools have been acquired sufficient to construct a working 3 kW solar PV system. The system includes solar PV panels, mounting rails and hardware, necessary electrical wiring and junction boxes, electrical inverters (micro and macro), electrical disconnect, and electric meter. Additional hardware and software can monitor system performance remotely.

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BCC students installing a 3 kW solar PV system on a simulated roof

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10.16 Electric Wiring Learning System

CATEGORY:
Alternative Energy

MANUFACTURER:
Amatrol

MODEL
85-MT6

:

MANUFACTURER PRODUCT PAGE:
http://www.amatrol.com/85-mt6/

Comments:

Current Class Utilization	
Number	Course Name:
SST 225	Wiring – Residential and Commercial Construction

DESCRIPTION: Amatrol's Industrial Electrical Wiring Learning System (85-MT6) introduces learners to the basics of electrical wiring, such as wire termination, wire sizing, conduit sizing, terminal block installation, and wire splicing, as well as how to read and create electrical prints. Amatrol's philosophy of presenting learners with the theories behind specific topics while they practice corresponding real-world tasks both expands the learner's understanding and helps them to develop a practical skill set.

The 85-MT6 includes a Control Panel (fuse blocks, control relays, control transformer, etc.), an Electro-Pneumatic Panel (pneumatic cylinder, limit switch, pressure switch, etc.), an Operation Panel (pushbuttons, indicator lamps, etc.), and two 3-Phase Induction Motors. These industrial-grade components ensure that learners work with instruments they would normally only see on the job, which helps them to gain confidence and experience.

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Learning Topics

- Introduction to Electrical Control
- Wiring
- Electrical Control
- System Wiring
- Pneumatic Control
- Circuit Wiring
- Electrical Prints
- Electric Panels
- Wiring Between Panels
- Wire Color Coding
- Wiring Between and Outside Panels
- Wire Bundling
- Electro-Pneumatic Valves
- Pneumatic Schematics
- Electro-Pneumatic System Installation

MANUALS / SOFTWARE:

Pemberton Campus Library -

- Electrical control wiring system learning activity packet 1 : introduction to electrical control wiring / Amatrol.[Reserve]

- Electrical control wiring system learning activity packet 2 : electrical control system wiring / Amatrol.[Reserve]

- Electrical control wiring system learning activity packet 3 : electrical control system wiring / Amatrol.[Reserve]

- Amatrol Installation guide for 85-MT6 electrical control wiring learning system -- Electrical control wiring system learning activity packet 1 : introduction to electrical control wiring -- Electrical control wiring system learning activity packet 2 : electrical control system wiring -- Electrical control wiring system : portfolio / assessment package.

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10.17 ***Power Distribution Learning System***

	CATEGORY: **Alternative Energy**
	MANUFACTURER: **Amatrol** MODEL **85-MT7**
	:
MANUFACTURER PRODUCT PAGE: http://www.amatrol.com/85-mt7/	
Comments:	

Current Class Utilization	
Number	Course Name:
SST 225	Wiring – Residential and Commercial Construction

DESCRIPTION: The model 85-MT7-B Electrical Power Distribution Learning System teaches installation of modern electrical power distribution systems. Learners will study industry-relevant skills to enable them to construct, troubleshoot, maintain, and repair the wiring in power distribution systems from the bus bar to the control panel. The 85-MT7-B includes a mobile workstation, (2) induction motors, bus bar unit with enclosure and bus plugs; junction and control boxes, disconnect switch, lockout/tag-out, student learning materials for both theory and lab, and teacher's guide.

The 85-MT7-B's workstation frame consists of movable members that can be rearranged to present each learner with a variety of conduit installation applications. Learners practice system layout by sizing conduit lengths and determining where to make bends to accomplish each task assigned in the learning materials. Industry standard safety practices are followed throughout the curriculum, and the workstation is equipped with a lockout/tag-out system and safety disconnect switch.

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Learning Topics

- Conduit Bending
- Conduit Installation
- Conduit Sizing
- Conduit Selection
- IMC Conduit
- EMT Conduit
- Flexible Conduit
- Bus Plug Installation
- Wire sizing
- Circuit Protection
- Disconnect Selection
- Disconnect Installation
- Fitting Types
- Fitting Selection
- System Layout
- Schematic Interpretation

MANUALS / SOFTWARE:

- Installation guide for 85-MT7-B power distribution learning system: Amatrol.
- Power distribution systems 1 learning activity packet 1: Introduction to raceways / Amatrol.
- Power distribution systems 1 learning activity packet 2: Basic conduit bending / Amatrol.
- Power distribution systems 1 learning activity packet 3 Advanced raceways / Amatrol.
- Power distribution systems 1 learning activity packet 5: Conduit sizing and wire pulling techniques / Amatrol.
- Power distribution systems 1: portfolio / Assessment package / Amatrol. [Reserve]

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10.18 Geothermal Energy Training System

CATEGORY:
Alternative Energy

MANUFACTURER:
Lab Volt

MODEL:
46126-A

MANUFACTURER PRODUCT PAGE:
http://www.labvolt.com/products/alternative-and-renewable-energy/geothermal/geohermal-energy-trainer

Comments: http://www.youtube.com/watch?v=_dmF2HmWgGM

Current Class Utilization	
Number	Course Name:
SST 221	Geothermal HVAC Systems

DESCRIPTION: The Lab-Volt Geothermal Training System, Model 46126-A is designed to teach the fundamentals of heat transfer, refrigeration, and air conditioning applied to geothermal energy HVAC projects. The operation of the training systems faithfully reproduces that of a typical geothermal residential system.

The Geothermal Training System, Model 46126-A, consists of a geothermal heat pump, ground loop heat exchanger, pumping station, domestic hot water system, circulation pump, control panel, the instrumentation required to measure the operating parameters of the system, plus a second heat pump. The second heat pump is used to control the temperature in the ground loop heat exchanger to simulate various ground conditions. All components are mounted in a mobile workstation that is sized to fit through standard door openings.

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Topics

- Geothermal Energy
- The Ground Loop
- Heat Pump Connections and Interior Piping
- The Refrigeration Cycle
- Psychrometrics
- Geothermal Heat Pumps
- Heat Exchangers
- Heat Pump Control and Safety Devices
- System Characterization
- Maintenance and Troubleshooting
- Geothermal Software Design Tools

MANUALS / SOFTWARE:

Pemberton Campus Library –

- Geothermal Heat Pump systems [DVD] / Lab-Volt.[Reserve]

- Geothermal Heat Pump Systems: Refrigeration, Air Conditioning, and Heating / Lab-Volt. [Reserve]

Also purchased: RHVAC version 9.0 : residential and light commercial HVAC loads : program user's manual / by Elite Software Development Inc.
[Reserve] (Software CD is maintained by OIT).

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10.19 Biodiesel Processor

CATEGORY:
Alternative Energy

MANUFACTURER:
Springboard Biodiesel

MODEL
BioPro 190

:

MANUFACTURER PRODUCT PAGE:
http://www.springboardbiodiesel.com/biopro190/biopro190

Comments:
With SpringPro T76 Waterless Washing System

Current Class Utilization	
Number	Course Name:
SST 231	Introduction to Biomass & Biofuels Technology

DESCRIPTION: The BioPro 190 and 190EX convert vegetable and animal oils into high quality (ASTM-grade) biodiesel. These oils are converted through heat, mixing and chemical processes called esterification and transesterification into biodiesel fuel which will run in any diesel engine without the need to modify that engine.

What's unique about the BioPro 190 is that the majority of this process is done by the machine with very little user interaction. Instead of having to turn valves, meter in chemicals, and carefully monitor the machine, you simply pour in your ingredients, press a button and walk away.

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Before starting the process, the user fills the machine with 50 gallons of filtered, dewatered oil. The oil can be any organic oil (tallow, fats, waste vegetable oil from restaurants or virgin oil pressed from crops). In most cases, waste vegetable oil is used due to it's wide availability.

After filling the machine with oil, the user fills the machine with a predetermined amount of catalyst and methanol. The catalyst is easily weighed and placed in the machine. The methanol is then added to the machine. The final step is to measure out the proper amount of sulfuric acid. The user then presses **"The Big Green Button"**, waits for the mixing to start and then pours the sulfuric acid into the machine. Then THE USER WALKS AWAY, allowing the machine to do its work. There is absolutely no need to monitor the machine at all. It does the majority of its work all by itself.

MANUALS / SOFTWARE:

Pemberton Campus Library –

- Owner's Manual : SpringPro T76 Drywash System

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10.20 Gas Chromatograph for Biodiesel Analysis

CATEGORY:
Alternative Energy

MANUFACTURER
Therma Scientific

Model
TRACE 1300

MANUFACTURER PRODUCT PAGE:
http://www.thermoscientific.com/ecomm/servlet/productsdetail_11152_L11262_80571_14718262_-1

Comments: Video
http://www.thermoscientific.com/ecomm/servlet/multimediadetail_11152_54811_-1

Current Class Utilization	
Number	Course Name:
SST 231	Introduction to Biomass & Biofuels Technology

DESCRIPTION: The Thermo Scientific TRACE 1300 Series Gas Chromatograph is a compact, versatile gas chromatography system that increases productivity and lowers cost in QA/QC and routine laboratories working on environmental, chemical and food safety applications. It features user-exchangeable, instant connect injectors and detectors and an intuitive interface in instruments that deliver reliable results and maximum sensitivity.

The GC (with autosampler – not shown) will initially be set-up to perform method **ASTM D 6584** *Determination of Total Monoglycerides, Total Diglycerides, Total Triglycerides, and Free and Total Glycerin in B-100 (100% biodiesel) Biodiesel Methyl Esters by Gas Chromatography* (Instrument set-up will be on the Pemberton Camus in Room 138A of the Lewis Parker Center; the method is on reserve in the Pemberton Library). However, the instrument is designed with modular, quickly operator-changeable injector and detector modules so that, if needed, the instrument may be quickly configured for other analyses.

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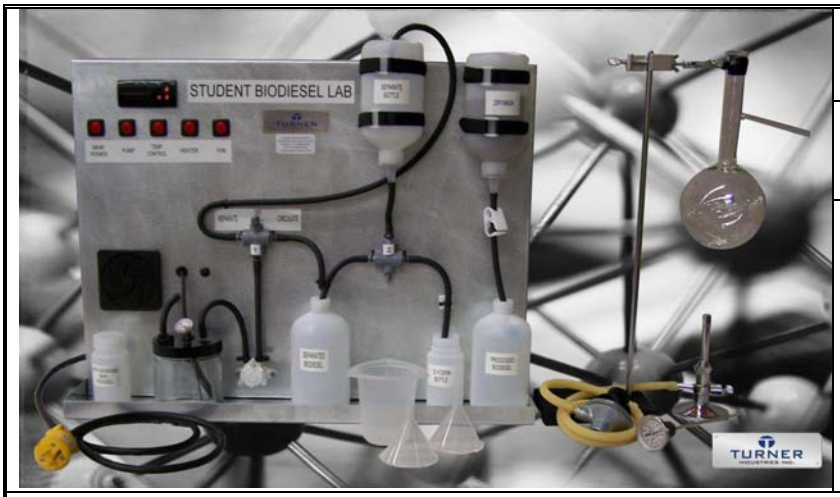
10.21 Student Biodiesel Lab



CATEGORY:
Alternative Energy

MANUFACTURER
Turner Biodiesel

Model

MANUFACTURER PRODUCT PAGE:
http://turnerbiodiesel.com/student_biodiesel_lab-starter_kit

Comments:

Current Class Utilization	
Number	Course Name:
SST 231	Introduction to Biomass & Biofuels Technology

DESCRIPTION: This lab was designed for schools and/or anyone that wants to learn how to make BioDiesel. This lab also is great for making test batches. (Make a small batch before processing in your big reactor or experiment with different oils and catalyst)

The 8 oz lab Features:

- Full Instructions
- Methanol recovery condenser
- Dry wash system
- Heating system
- Glass reactor
- Reactor pump with Viton seals
- Glycerol separation funnel
- Titration kit with scale
- 250ml Beaker for the final product
- 110 V Power

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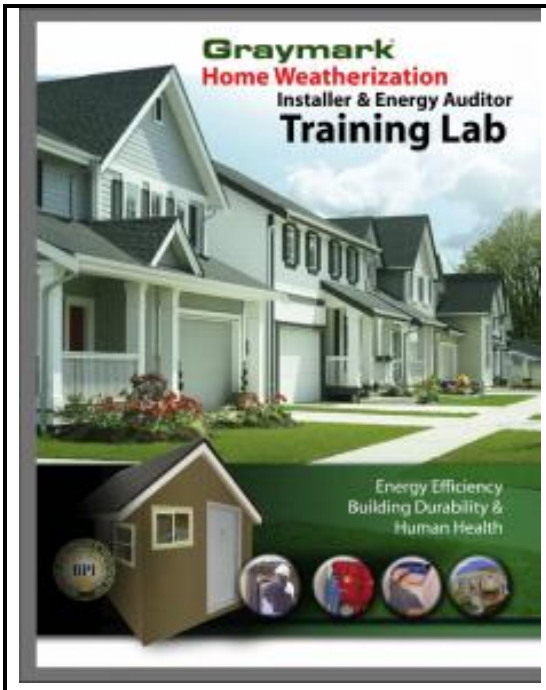
11 Energy Efficiency

11.1 Weatherization Auditor Training Lab



CATEGORY:
Energy Efficiency

MANUFACTURER:
Lab Volt/Graymark

:

MANUFACTURER PRODUCT PAGE:

Comments:
Brochure: http://www.labvolt.com/downloads/datasheet/SEALnVENT.pdf
Video: http://www.youtube.com/watch?v=jULIajGYREY

Current Class Utilization	
Number	Course Name:
SST 110	Energy Auditing for Residential Buildings

DESCRIPTION: Weatherization auditing is the practice of protecting a home or building, its interior, and its occupants from the elements, particularly from sunlight, precipitation, and wind, and of modifying a building to reduce energy consumption and optimize energy efficiency.

With the Graymark Home Weatherization Installer and Energy Auditor Training Lab, students will become proficient in energy conservation and weatherization, learning the "whole house" approach, focusing on efficient bypass sealing, heat loss theory, pressure effects, and moisture problems and mitigation.

They will be able to identify problems within a structure and develop a strategy for corrective measures.

Topics Covered

Energy Auditor

- Reporting
- Inspection and Measurements
- Thermal Imaging
- Blower Door
- Diagnostic Testing

Weatherization Installer

- Weatherization Measures
- Building Science
- Home as a System
- Safe Work Practices
- Basic Competency Skills

Student Exercises

Fourteen hands-on, real-world exercises include:

- Air Sealing
- Wall Insulation
- Weather Stripping
- Two-Part Spray Foam
- Duct Insulation
- Attic Treatment and Insulation
- Stack Effect
- Duct Blaster
- Blower Door
- Exhaust Fan Flow Meter
- Back Draft
- Combustion Analysis
- Carbon Monoxide Detection
- Infrared Camera and Thermographic Measurement Techniques

Training Lab Packages

This Training System is offered as a 6 student configuration. Each System contains all necessary courseware, components, equipment, and tools required to implement a successful Home Weatherization Installer & Energy Auditor training program.

The key elements included in the Program are:

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1. Classroom Package
2. Instructor's Package
3. Work Station Package
4. Student Package

I. CLASSROOM PACKAGE

The Classroom Package provides state-of-the-art instruction in Weatherization with real world hands-on experiences. The training program consists of the following items:

1. **Diagnostic House with Diagnostic House Modules**

Simulated house providing a living space and attic, constructed with standard size window and doors to allow student to experience installation and identification of weatherization techniques.

Ceiling Panels

The Diagnostic House ceiling panels are designed to be removable and interchangeable. Some of the Ceiling Panels shall be removed and replaced with Diagnostic House Modules, which are modified Ceiling Panels.

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Ceiling Panels	
Easily Removable and interchangeable	

Diagnostic House Modules Included:

- **Recessed Lighting Fixture**
  Typical residential Recessed lighting fixture mounted in a House Ceiling Panel.
- **Combustion Appliance Vent**
  Used to vent Combustion Appliance Work Station into house attic space allowing Worst Case Depressurization Test, Spillage Test, Vent Draft Test.
- **Exhaust Fan**
  Measurement of Exhaust Fan Flow
- **Duct Leak**
  Measurement of Air Flow in Duct Leak
- **Leak Insertion Window**
  Multiple Faults provide easy access and control of simulated Air leaks while conducting pressurization testing.

2. **Test Equipment**

The Weatherization Training Lab contains all the necessary tools to properly conduct a thorough Home Weatherization Energy Audit of a residential structure.

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All testing equipment is professional grade and industry- standard. Each Equipment Package include the following components.

- Blower Door
- Inspection Mirror
- Duct Blaster
- Smoke Emitter Pen
- Infrared Camera
- Infrared Thermometer
- Combustion Gas Analyzer
- Exhaust Fan Flow Meter
- Carbon Monoxide Analyzer
- Radiation Detector
- Combustible Gas Detector
- Moisture Meter
- Pressure Pan

II. INSTRUCTORS PACKAGE

Each Instructors package includes instructional material, equipment to test students' work, and tools for instruction.

- Instructor's Guide
- Instructor's PowerPoint Presentations
- Training Aids
- Building Analyst Field Training Video
- Student Courseware

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III. WORKSTATION PACKAGE

Each Work Station Package contains stand-alone Work Stations that students use to prepare themselves to perform installation and energy auditing tasks. The package includes the following Work Stations:

Insulation Installation This station will provide students with the Hands-On experiences to properly install various types of insulation in standard residential environments.	
Attic Air Sealing Providing experiences in properly sealing Recessed Light Fixtures, Air Vents and Plumbing Vents.	
Duct System Measuring duct leakage using a simulated wall with supply and return vents. Installed faults provide the flexibility to monitor and identify duct leakage.	
Combustion Appliance • Undiluted CO Burner Tests • Combustion Appliance Test under the Combustion Appliance Zone (CAZ) Worst Case Depressurization • Test for spillage • Measure Draft…and more.	

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In addition to Theory, PowerPoints and Exercise Worksheets students can demonstrate the effects corresponding to the theory instruction. Two main training aids are.

Pressure House The Pressure House Training Aid simulates a multi-zone environment with doors and simulated venting. Students are introduced to Back drafting as well as an introduction to testing with a Pressure and Flow Gauge.	
Stack Effect Warm Air Rises, Cold Air Falls, this cycle is called stack effect and as a result; there is a "Neutral Zone" between them. Student can demonstrate their understanding using the Stack effect Training Aid.	

IV. STUDENT PACKAGE

The Training Lab contains 6 Student Packages. Each package includes curriculum, tools and consumables that a student needs to complete the course. The Student Package contains.

- Student Manual
- Residential Energy Textbook
- Energy Audit Field Guide
- Installer Exercise Work Sheets
- Installer Job Sheets
- Energy Auditor Exercise Work Sheets
- Energy Auditor Job Sheets
- Hand outs

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MANUALS / SOFTWARE:

Pemberton Campus Library -

- Home weatherization installer & energy auditor training lab / Graymark International, [Reserve]

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11.2 Building Air-tightness Testing System

<table>
<tr><td rowspan="4"> </td><td>CATEGORY:
Energy Efficiency</td></tr>
<tr><td>VENDOR:
The Energy Conservatory</td></tr>
<tr><td>MODEL:
Minneapolis Model 3 Blower Door with Accessories

DG-700 Pressure and Flow Gauge</td></tr>
<tr><td></td></tr>
<tr><td colspan="2">VENDOR PRODUCT PAGE:
http://www.energyconservatory.com/products/automated-blower-door-systems-and-accessories</td></tr>
<tr><td colspan="2">Brochure:
http://www.energyconservatory.com/sites/default/files/documents/bdbrochure.pdf
Video:
http://www.youtube.com/watch?feature=player_embedded&v=67v_rTaZmOA</td></tr>
</table>

Current Class Utilization	
Number	Course Name:
SST 110	Energy Auditing for Residential Buildings
NRG 121	Air Conditioning Systems Analysis

DESCRIPTION: The Minneapolis Blower Door has long been recognized as the best designed and supported building air-tightness testing system in the world. Combined with specialized accessories and testing procedures developed by The Energy Conservatory, the Minneapolis Blower Door is the system of choice for utility DSM programs, energy raters, HVAC contractors and weatherization professionals.

FEATURES:

- Complete with everything needed for fully automated Blower Door testing.
- Built-in Cruise Control allows you to automatically control the Blower Door fan to maintain a constant 75 Pa, 50 Pa, 25 Pa or 0 Pa building pressure without having the gauge connected to a computer.
- Precise, stable flow measurements without the need for gauge dampening.
- The Model 3 Fan provides quick and accurate flow measurements from 300 to 6,300 CFM (includes Flow Rings A and B).
- Optional Flow Rings C, D and E will measure down to 11 CFM.
- Variable fan speed control (solid state - cruise control compatible).
- The standard Model 3 Minneapolis Blower Door system includes a single fan, the DG-700 pressure and flow gauge with Cruise Control, the adjustable aluminum frame and nylon panel, and our TECTITE software.

SOFTWARE:

TECTITE Ver. 4.0 (WiFi) Building Airtightness Test Analysis Software (included with every system)

- Designed specifically for use with Minneapolis Blower Door systems.
- Calculates building airtightness test results (including leakage areas, ACH50, CFM50, building leakage curve), estimated natural and design infiltration rates, and cost of air leakage.
- Choice of 4 airtightness test standards: CGSB-149.10-M86 and the three RESNET test standards including One-Point, Multi-Point and Repeated Single-Point procedures.
- Compatible with both manual Blower Door tests and automated tests using our DG-700 or APT system.
- User-friendly data entry screens, file storage, file retrieval and report generation features (including pdf file generator).
- Compare feature generates test comparison report for any two previously saved building test files.

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11.3 Duct Leakage Testing Appliance

<table>
<tr><td> </td><td>CATEGORY:
Energy Efficiency</td></tr>
<tr><td></td><td>VENDOR:
The Energy Conservatory</td></tr>
<tr><td></td><td>MODEL:
The Minneapolis Duct Blaster with DG-700 Pressure and Flow Gauge

DG-700 Pressure and Flow Gauge</td></tr>
<tr><td colspan="2">VENDOR PRODUCT PAGE:
http://www.energyconservatory.com/products/duct-blaster%C2%AE-systems-and-accessories</td></tr>
<tr><td colspan="2">Comments:
Brochure:
http://www.energyconservatory.com/sites/default/files/documents/duct_blaster_lit_2012_web.pdf
Video: http://www.youtube.com/watch?feature=player_embedded&v=sk-A08zsguE</td></tr>
</table>

Current Class Utilization	
Number	Course Name:
SST 110	Energy Auditing for Residential Buildings
NRG 112	Commercial Energy Use Analysis
NRG 121	Air Conditioning Systems Analysis

DESCRIPTION: The Minneapolis Duct Blaster® is used for performance testing of forced air distribution systems for builders, HVAC contractors, and in a variety of utility programs. The Duct Blaster is also used for code compliance for total duct leakage and duct leakage to the outside. The Minneapolis Duct Blaster is a calibrated air flow measurement system designed to test and document the airtightness of forced air duct systems in both houses and light commercial buildings. Duct airtightness measurements are used to diagnose and demonstrate leakage problems, estimate efficiency losses from duct leakage, and certify compliance with duct leakage standards.

METHOD OF USE: The Duct Blaster fan is connected directly to the duct system in a house, typically at a central return, or at the air handler cabinet. With the remaining registers and grilles temporarily taped off, duct airtightness is measured by either pressurizing or depressurizing the duct system and precisely measuring the fan flow and duct pressure.

FEATURES:

- The lightweight Duct Blaster fan weighs just 7 pounds, but delivers enough air flow (1,500 CFM) to test the leakiest duct systems.
- Quick and accurate airtightness measurements from 10 - 1,500 CFM.
- Compatible for both pressurization and depressurization testing.
- New Cruise Control feature will automatically control the speed of the Duct Blaster fan during testing.
- The Duct Blaster can be easily used in new construction applications where a Blower Door can't be used (e.g. before sheet rock is installed).
- The Duct Blaster can also be used as a powered capture hood to accurately measure air flows through the air handler fan, registers and grilles, and exhaust fans. The new FlowBlaster capture hood accessory will accurately measure supply, return and exhuast flows from 10 to 300 CFM.
- Padded nylon carrying case with shoulder strap.

SOFTWARE: TECBLAST™ Duct Airtightness Test Software

- Easy entry of test data on user friendly entry screens.
- Calculation and display of duct airtightness test results including leakage rate in CFM, leakage area in square inches, leakage as a percent of system airflow, and estimated annual system efficiency loss from the measured leakage rate.
- Built-in report generator includes the choice of a one page easy-to-read homeowner report, or a two page technical report.

ADDITIONAL INFORMATION: Minneapolis Duct Blaster Kit includes

- Duct Blaster Fan with Fan Speed Controller.
- DG-700 Digital Pressure and Flow Gauge.
- Three Flow Rings.
- Twelve feet (3.7 m) of 10 in. (25 cm) diameter flex duct.
- Heavy Duty Carrying Case.
- Static pressure probe.
- Sample roll of DuctMask™ Temporary Register Seal.
- Manual and Duct Blaster Training Video.
- TECBLAST Software CD

MANUALS:

Pemberton Campus Library -

- DG-700 Cheat Sheet
- Duct Blaster Template

11.4 Absolute Pressure Meter

<table>
<tr><td rowspan="3"> </td><td>CATEGORY:
Energy Efficiency</td></tr>
<tr><td>MANUFACTURER:
Testo</td></tr>
<tr><td>MODEL
0511
 </td></tr>
<tr><td colspan="2">MANUFACTURER PRODUCT PAGE:
http://www.testo.com/online/abaxx-?$part=PORTAL.INT.ContentDesk&$event=show-from-menu&categoryid=10423727</td></tr>
<tr><td colspan="2">Comments: 2 units available
Brochure:
http://www.testo.com/online/embedded/Sites/INT/SharedDocuments/ProductBrochures/0560_0511_en_01.pdf</td></tr>
</table>

Current Class Utilization	
Number	Course Name:
SST 110	Energy Auditing for Residential Buildings
NRG 112	Commercial Energy Use Analysis
NRG 121	Air Conditioning Systems Analysis

DESCRIPTION: The pocket-sized testo 0511 quickly performs pressurization risk assessments for combustion air zones as well as room to room pressurization tests without running a reference hose. It measures absolute pressure to an accuracy of ±3 hPa. The measuring instrument is ideal for absolute pressure compensation during flow velocity measurements with a Pitot tube, for example. By entering the altitude above sea level, this is converted into barometric air pressure. In addition to this, a barometric pressure measurement between two points is also possible. The eight switchable pressure units offer the user highest flexibility in measurement.

11.5 Carbon Monoxide Monitor

<table>
<tr><td> </td><td>CATEGORY:
Energy Efficiency</td></tr>
<tr><td rowspan="2"></td><td>MANUFACTURER:
Testo</td></tr>
<tr><td>MODEL
317-3
 </td></tr>
<tr><td colspan="2">MANUFACTURER PRODUCT PAGE: http://www.testo.com/online/abaxx-?$part=PORTAL.USA.ContentDesk&$event=show-from-menu&categoryid=49805219</td></tr>
<tr><td colspan="2">Comments: 2 units available
Videos: http://www.youtube.com/watch?v=T-fk0sFEuv0#t=12 , http://www.youtube.com/watch?v=j2mDps-xZRg#t=51
Brochure: http://www.testo.com/online/embedded/Sites/USA/SharedDocuments/ProductBrochures/0632_3173_en.pdf</td></tr>
</table>

Current Class Utilization	
Number	Course Name:
SST 110	Energy Auditing for Residential Buildings
NRG 121	Air Conditioning Systems Analysis

DESCRIPTION: The testo 317-3 CO monitor detects the presence of carbon monoxide (CO) in ambient air and warns the user both visually and audibly about dangerous CO concentrations during furnace and boiler service and maintenance, weatherization audits or home inspections.

Features:

- Range: 0–1999 ppm
- Resolution: 1 ppm
- Runs on two AAA (not included) batteries for 150 hr. with alarm off
- Adjustable limit alarm - visual and audible
- Includes leather case with belt clip and ear bud

11.6 Moisture Meter - Concrete

	CATEGORY: **Energy Efficiency** MANUFACTURER: **TRAMEX LTD.** MODEL CMEXpert
MANUFACTURER PRODUCT PAGE: http://www.tramexltd.com/Our_Products_Details.aspx?ID=20	
Comments: Web page for CMEXpert Moisture and Humidity Meter is no longer available. The above page is for the CMEX II instrument.	

Current Class Utilization	
Number	Course Name:
SST 110	Energy Auditing for Residential Buildings
SST 121	Air Conditioning Systems Analysis

DESCRIPTION: The Tramex CMEXpert Concrete Moisture & Humidity Meter is combines nondestructive moisture and humidity measurement for concrete, gypsum and wood. The CMEXpert is suited for both pre-installation and post-installation testing and evaluation of flooring materials, floor slabs and substrates. The Tramex CMEX has 4 scales: Concrete, Gypsum, CM Equivalent and a Reference scale.

11.7 Moisture Meter - Wood

	CATEGORY: **Energy Efficiency**
	MANUFACTURER: **General Electric**
	MODEL **Protimeter Mini BLD2000**
VENDOR PRODUCT PAGE: http://www.testequipmentdepot.com/protimeter/moisture-meters	
Video: http://www.youtube.com/watch?v=h5cPks9v1Lg	

Current Class Utilization	
Number	Course Name:
SST 110	Energy Auditing for Residential Buildings
SST 121	Air Conditioning Systems Analysis

DESCRIPTION: The GE Protimeter BLD2000 Mini is a compact, general purpose pin type moisture meter used for assessing moisture conditions in buildings. The GE Protimeter Mini BLD2000 is used to measure the moisture content of wood and the wood moisture equivalent (WME) value of other non-conductive materials.

In wood, the Protimeter Mini BLD2000 measures the moisture content from 6 – 28%, the level at which the fibers are saturated. In other non-conductive materials, the instrument measures the WME value up to 28%. The WME value is the theoretical moisture level that would be attained by wood that is in moisture equilibrium with the material being tested. The full measurement range is from 6 – 90, but values over 28 are relative; they indicate increasingly high levels of moisture rather than actual moisture content.

Proprietary – Burlington County College use only

11.8 Vane Anemometer

<table>
<tr><td> </td><td>CATEGORY:
Energy Efficiency</td></tr>
<tr><td></td><td>MANUFACTURER:
Testo</td></tr>
<tr><td></td><td>MODEL
606-1
 </td></tr>
<tr><td colspan="2">MANUFACTURER PRODUCT PAGE:
http://www.testolimited.com/p/285/testo-417-vane-anemometer</td></tr>
<tr><td colspan="2">Comments: 4 units available
Brochure:
http://www.testo.com/online/embedded/Sites/INT/SharedDocuments/ProductBrochures/0560_4170_en_01.pdf</td></tr>
</table>

Current Class Utilization	
Number	Course Name:
SST 110	Energy Auditing for Residential Buildings
SST 121	Air Conditioning Systems Analysis

DESCRIPTION: The testo 417 is a compact, large-area anemometer with a built-in flow velocity / temperature vane. It measures flow velocity, volume flow and temperature.

It features integrated measurement with the 100 mm vane, and is ideally suited for measurements at air input and output vents. The flow direction, i.e. blowing or sucking flow, is visible in the display. The optional funnel set additionally allows measurements on ventilation grilles and disc outlets. The volume flow is directly shown in the display. For the purposes of volume flow calculation, the duct area can be easily entered into the testo 417. In addition, the instrument can be switched over to display the current temperature. Timed and point mean value calculation provide information on the average volume flow, flow velocity and temperature measurement value. The Hold function allows the current measurement value to be frozen in the display. Min/max values are also displayed at the press of a button.

11.9 Combustible Gas Detector

<table>
<tr><td>
</td><td>CATEGORY:
Energy Efficiency

MANUFACTURER:
TIF

MODEL: 8900
 </td></tr>
<tr><td colspan="2">MANUFACTURER PRODUCT PAGE:</td></tr>
<tr><td colspan="2">Comments: 4 units available
Brochure:</td></tr>
</table>

Current Class Utilization	
Number	Course Name:
SST 110	Energy Auditing for Residential Buildings
SST 121	Air Conditioning Systems Analysis

DESCRIPTION: TIF8900 is used in situations where a combustible gas, vapor or residue needs to be found:

- Gas lines and Pipes
- Exhaust and Fuel leaks
- Propane filling stations
- Fuel in marine bilges
- Heat Exchanger leaks
- Check manholes for safety
- Detect arson residue
- IAQ tests
- Liquid or gas fired heating systems

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Features:

- Solid state sensor technology, long life and precision
- Broad band of combustible gas detection
- Sensitivity as low as 5 ppm
- Adjustable sensitivity
- Audible "Geiger counter" signal
- LED Leak Intensity Lights
- Automatic warm up
- Cordless operation
- Flexible 16" stainless probe for hard to reach places
- Rechargeable battery and charger included
- Rugged custom carrying case
- Made in the USA

Proprietary – Burlington County College use only

11.10 Combustion Analyzer

	CATEGORY: **Energy Efficiency**
	MANUFACTURER: **Bachrach**
	MODEL **Fyrite Insight**
VENDOR PRODUCT PAGE: http://www.instrumart.com/products/31318/bacharach-fyrite-insight-combustion-analyzer	
Video: http://www.youtube.com/watch?v=rJT9Sis4VZI	

Current Class Utilization	
Number	Course Name:
SST 110	Energy Auditing for Residential Buildings
SST 121	Air Conditioning Systems Analysis

DESCRIPTION: The Bachrach Fyrite Insight is a five-in-one combustion analyzer with field-upgradeable software and smart sensor technology.

Features

- Measured ranges:
  - Combustion air/ambient temperature: -4 to 600°F (-20 to 316°C)
  - Flue gas temperature: -4 to 1200°F (-20 to 649°C)
  - Oxygen: 0.0 to 20.9% O2
  - Carbon monoxide: 0 to 2,000 PPM CO
  - Draft/differential pressure: -100 to +100 in. WC
- Calculated ranges:
  - Combustion efficiency: 0.1 to 100%
  - Carbon dioxide: 0.1% to a fuel dependant max.
  - Carbon monoxide (air free): 0 to 9,999 PPM
  - Excess air: 0 to 250%
- Selectable fuels: natural gas, oil #2, oil #4, oil #6, propane, coal, wood, kerosene
- B-Smart sensor technology
- Graphic backlit LCD display
- PC based software and reporting package (optional)

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11.11 Radiation Detector

CATEGORY:
Energy Efficiency

MANUFACTURER:
Gamma-Scout

MODEL
Standard

MANUFACTURER PRODUCT PAGE:
http://www.gammascout.com/geigercounter.html

Comments:

Current Class Utilization	
Number	Course Name:
SST 110	Energy Auditing for Residential Buildings
SST 121	Air Conditioning Systems Analysis

DESCRIPTION: The Gamma-Scout hand-held radiation detector or Geiger counter is a general purpose survey meter for measuring and detecting ionizing radiation. It can detect alpha, beta, gamma and x-ray radiation. The Gamma-Scout can be used to:

- Determine the source of radiation leakages
- Monitor ambient radiation anomalies
- Monitor personal cumulative dose exposure
- Detect radioactive elements in metal scrap
- Check rocks from the earth for radioactivity
- Teach or learn about radioactivity

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11.12 Home Performance Testing – Diagnostic Scale Model

	CATEGORY: **Energy Efficiency**
	MANUFACTURER: **Community Housing Partners**
	Model **House of Pressure**
MANUFACTURER PRODUCT PAGE: http://www.communityhousingpartners.org/development/energy_services/nrcert.shtml	
Comments: Comes with Training Manual and Training Video (DVD)	

Current Class Utilization	
Number	Course Name:
SST 110	Energy Auditing for Residential Buildings

DESCRIPTION: CHP Energy Solutions Research and Training Center (formerly known as NRCERT) developed the **House of Pressure** to complement its training activities. Featured in the March/April 2010 issue of *Home Energy Magazine*, this unique training aide is used to visually demonstrate pressure and air flow dynamics within a residence. The model has the ability to create and control airflow with working scaled reproductions of mechanical air distribution systems that are found in most residential homes. The use of the House of Pressure can greatly reduce the amount of lecture time required to describe the information presented.

The House of Pressure is used to visually demonstrate Home Performance Testing using Pressure Diagnostics. The House is made of clear lexan (High Strength Plastic Laminate) so the inside of the House is visible from all 4 sides. The House has an operable Forced Air Duct System, a Dryer, Bathroom Fan, Fireplace, and Water Heater. There are smoke generators for the fireplace, water heater, and car exhaust.

MANUALS / SOFTWARE:

Pemberton Campus Library -

- The house of pressure [DVD]: setup and performance testing video / New River Center for Energy Research and Training.[Reserve]

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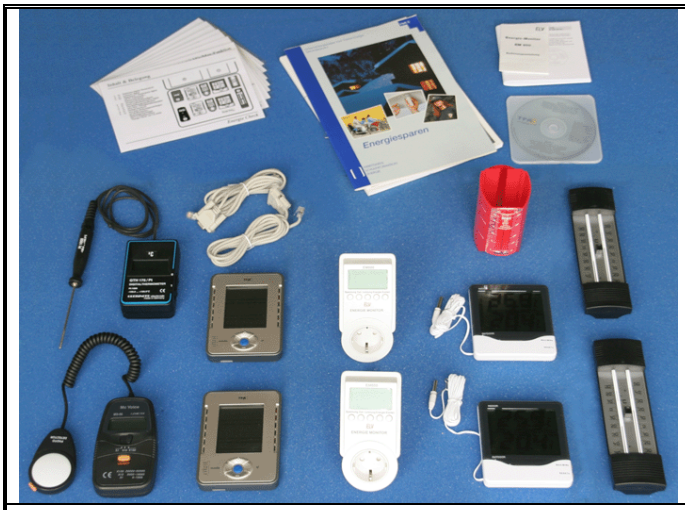
11.13 Basic Energy Measurement & Assessment Tools



CATEGORY:
Energy Efficiency

MANUFACTURER:
US Didactic

MODEL:
AE 104

MANUFACTURER PRODUCT PAGE:
http://www.usdidactic.com/html/alternative_energy_educational.html

Comments:

Current Class Utilization	
Subject:	Course Name:
NRG 121	Air Conditioning Systems Analysis
SST 110	Energy Auditing for Residential Buildings

DESCRIPTION: A collection of test instruments for measurement of various forms of energy in the environment. Measures room air quality, surface temperature, indoor & outdoor temperature, illuminance levels, water consumption, and energy consumption of electrical appliances.

Equipment:
(1) **Digital Lux Meter** - Effective range 0 - 50,000 Lux.; Metering precision +/- 5%
(1) **Precision Digital Thermometer** - External sensor for measuring of surface, water and air temperatures; Effective range -199.9 ...+199.9C; Resolution 0.1 C
(2) **Digital Energy Assessment Meters** - Measures energy, power (Effective power), voltage, measuring duration, duty cycle, costs, minimum / maximum values, cost prognosis
(1) **Flow Meter** - Effective range 1 to 25 l/minute
(2) **Digital Hygrometers** - Effective temperature range 0 .. + 59.9 C; Metering precision +/- 0.5C; Effective range relative air humidity 1 .. 99 %; Metering precision +/- 3%; Alarm presets; Average dew point values; Large LCD-display; Data logger; Selectable time interval
(2) **Digital Thermometers** - Indoor / Outdoor sensors; Effective range indoor

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temperature -10 ...+60C; Effective range outdoor temperature -50 ...+70C; Large LCD-display
(2) **Analog Thermometers (Indoor)** - Effective range -35 ...+50C
(2) **Metric / Imperial Conversion Calculators**

CAPABILITIES:

Indoor Air Quality - Relative air humidity and air temperature can be measured with two supplied hygrometers. Data is displayed on a LCD screen and values can be saved in the instruments' data logger. Dew Point is then calculated from collected values for relative humidity and air temperature. The data can be downloaded to a computer using the included software and serial cable.

Surface Temperature - Students can measure surface, water and air temperatures. The wall temperature can be inspected for critical dew points (potential mildew).
Indoor / Outdoor Temperature - Minimum and maximum indoor / outdoor temperatures are measured with digital thermometers. The two analog thermometers are used to record high and low air temperatures.

Illuminance Level - Students measure levels of illuminance in classrooms for adequate and even distribution of light, necessary to prevent ocular fatigue. This enables them to detect lighting deficiencies and identify energy loss due to excessive illumination.
Water Consumption - Water consumption is measured at multiple lab spigots using the enclosed flow meter.

Energy Consumption of Electrical Appliances - The amount of energy consumed and the cost to operating electrical appliances is measured by data collection.

MANUALS / SOFTWARE:

OPERATOR'S INSTRUCTION MANUAL
DATALOGGING SYSTEM – DATA RECORDER (DISC INCLUDED)

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11.14 Commercial Energy Management Toolkit

CATEGORY:
Energy Efficiency

MFTR:
As listed

MODEL:
As listed

Available: 9 toolkits

Comments: This toolkit is based upon "The Energy Management Toolkit" by Northwest Energy Education Institute (NEEI) www.nweei.org . Descriptions given below are from the NEEI document http://www.nweei.org/images/pdf_files/sampleresources/energy_management_toolkit_web.pdf .

Current Class Utilization	
Subject:	Course Name:
NRG 112	Commercial Energy Use Analysis
NRG 121	Air Conditioning Systems Analysis
SST 110	Energy Auditing for Residential Buildings

DESCRIPTION: The selection of tools for this kit is built upon [NEEI's] many experiences with students and professional feedback from the Energy community. It is by no means a complete kit but should is comprehensive enough to accurately measure and verify energy movement within buildings.

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Professional HOBO FlexSmart Logger for Energy Monitoring The HOBO Energy Logger is a 15 channel indoor data logger with the ability to measure and record almost any environmental condition using the required FlexSmart Modules. **The Energy Logger allows you to measure and record:** >> AC/DC Current, AC/DC Voltage,4-20mA >> Power, Kilowatts, Kilowatt Hours >> Pressure (Differential, Barometric, Gauge) >> Pulse and Analog Inputs >> Wind, Rain, Light, Carbon Dioxide >> Temperature and Relative Humidity	
USB=>Serial Adapter w/Serial Cable for FlexSmart Logger Keyspan USB-to-serial adaptor for use with all RS-232 serial devices and a PC 3.5 Interface Cable for PC computers. The Keyspan "High Speed" USB Serial Adapter is used with modems, digital cameras, ISDN terminal adapters, graphics tablets, PDAs, bar code scanners, label printers and other serial devices, which require an RS-232 connection.	
Small Hobo® U12 Dataloggers (2 included) Temp/RH/Light/External Input This temperature, relative humidity and light intensity indoor data logger provides easy-to-use monitoring of temperature. Programmable sampling rates from one second to 18 hours. Non-volatile memory retains data even if the battery fails. User replaceable battery lasts ~one year. **T. Range:** -4°F to 158°F (-20°C to 70°C) , **Accuracy:** +/-0.63° @ 77°F (+/-0.35° @ 25°C) **Relative Humidity Range:** 5% to 95% RH, **Accuracy:** +/-2.5% RH from 10% to 90% **Light Intensity:** 1 to 3,000 lumens/sq. ft. (footcandles) **Accepts One External Sensor:** Yes	

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12-bit Temperature Sensor, 6-meter Cable (3 included) The full measurement range is -40° to 100° C (-40° to 212° F). The S-TMB-M006 Sensor is for use in **Indoor , Outdoor and Underwater** environments.	
FlexSmart AC Power Adapter Recommended if deploying datalogger over extended period of time and or if deployment location is near an AC outlet.	
20 Amp. split-core current transformer, 0.75 in. opening 50 Amp. split-core current transformer, 0.75 in. opening 100 Amp. split-core current transformer, 1.25 in. opening	
Strait-Line Sonic Laser Tape – up to 50 Ft. Sonic laser tape with laser targeting to accurately locate measurement end point. 50 ft.range, 1 in. resolution. Fairly accurate and fast - a great estimating tool but one that may be less useful in a professional setting where laser taps are far more accurate and reliable. * Laser Targeting indicates end point of measurement. * Can automatically calculate area and volume by doing the math	

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Sylvania DS-3050 Light Meter - (replaces highly popular DS-205 ~$260). The SYLVANIA Light Meter DS-3050 is a hand held illuminance meter that delivers accurate reading (+/- 3%) of light levels over a wide measurement range (0.000-4000 fc/0.00-40,000 lx). These meters can be used as a convenient way to check existing light levels and identifying energy savings opportunities as well as for validating new lighting installations and ensuring properly lit environment. Auto ranging and selectable range display. Automatic power off after 30 minutes. Hold function. Low battery indicator. Protective case included	
Raytek RAYMT6U Non-contact Infrared Thermometer Features single dot laser sighting system and the large temperature display provides current and maximum readings together while scanning. Protective boot for added durability. FYI: A less expensive IR gun is Ryobi IR001 for ~$30 but is less accurate. **Product Features** **Temperature Range:** -30 to 500°C -20º to 932 ºF , **Accuracy:** ±1.5%, or ±1.5°C ±3°F whichever is greatest **Distance to Spot Size:** 10:1 **Response Time:** 500 mSec **Emissivity:** Pre-set at 0.95	
Kestrel 3000 Pocket Weather Meter Measures temperature and air speeds, plus relative humidity and heat stress readings. Compact size, high durability. An externally located temperature sensor and waterproof casing allow you to gauge the temperature of water (it even floats) and snow, as well as the open air. A hard slide-on case, lanyard, and battery are included. **Accurately Measures:** • Wind Chill • Air, Water, and Snow Temperature (displayed in Fahrenheit or Celsius w/ accuracy of +/-1 degree) • Current, Average, and Maximum Wind Speed (displayed in: Beaufort Wind Scale; Knots; MPH; KPH or Feet Per Minute) • Relative Humidity • Dew point • Heat Stress Index	

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A.W. Sperry DSA500A 5-Function 9-Range 400-Amp Clamp Meter 5-Function 9-Range 400-Ampere Digital Clamp Meter is a **compact** Digital Snap-Around Volt-Ohm-Ammeter. UL listed to both US and Canadian Standards. Meets CE Requirements, Auto Power Off (SLEEP) High Accuracy Digital Ready, Continuity, Data Hold, Recessed Safety Designed Input Terminals. Includes Test Leads, runs on two AAA batteries	
Sensor Switch D-1 Ballast Discriminator (new number is BD-1) The D-1 (now BD1) Ballast Discriminator can determine retrofit opportunities by quickly distinguishing between magnetic and electronic ballasts. Simply point the Discriminator at the light fixture, then press and hold the button until the LED lights. If the LED lights Green, the ballast is electronic; if the ballast lights orange, the ballast is magnetic.	

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11.15 'Kill A Watt' Power Monitor

CATEGORY:
Energy Efficiency

MANUFACTURER:
P3 International

MODEL:
Kill A Watt EZ P4460

MANUFACTURER PRODUCT PAGE:
http://www.p3international.com/products/p4460.html

Comments: 7 units available
Video: http://www.youtube.com/watch?v=V8u06os1IqQ

Current Class Utilization	
Subject:	Course Name:
NRG 101	Introduction to Energy Management
NRG 121	Air Conditioning Systems Analysis
SST 110	Energy Auditing for Residential Buildings

DESCRIPTION: The Kill A Watt EZ power monitor allows assessment of appliance energy costs and determination of which appliances are actually worth keeping plugged in. Simply connect these appliances to the Kill A Watt® EZ, and it will assess their energy use. The instrument has a large LCD display and will count energy consumption by the Kilowatt-hour, the same as the local utility. Allows calculation of cumulative electrical expenses and forecasting by the day, week, month, or entire year. Also checks quality of the power by monitoring voltage, line frequency, and power factor.

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11.16 Commercial Building Air Flow Capture Hood - Balometer

	CATEGORY: **Energy Efficiency** MANUFACTURER: **Alnor** MODEL: **ABT701**
MANUFACTURER PRODUCT PAGE: http://www.alnorcanada.ca/alnor-balometer-capture-hoods-abt-7011.htm	
Comments: Analog readout; 2’ x 2’ hood	

Current Class Utilization	
Number:	Course Name
NRG 112	Commercial Energy Use Analysis
NRG 121	Air Conditioning Systems Analysis

DESCRIPTION: By placing an Alnor ABT701 Balometer® Capture Hood over a diffuser or grille, you can measure air volume in order to balance buildings and verify air flow distribution. The easily observed trend values and fast meter response make the ABT701 Balometer® capture hood the preferred instrument for facility engineers.

APPLICATIONS

- •Thermal Comfort
- •HVAC testing, adjusting and balancing
- •Air volume measurements

INCLUDES

- •Instrument and hood
- •Carrying case
- •NIST calibration certificate
- •Owners manual
- •Two-year warranty
- •Batteries

FEATURES & BENEFITS

- •Simple to read analog meter for quick measurements
- •Easy to carry with one hand using sturdy middle handle
- •Operates on 4 AA batteries
- •Hood size is 2' X 2' (610 mm x 610 mm)
- •Measurement range: 30–1000 cfm (ft3/min)
- •Measurement hold switch
- •Light weight (7.4 lbs; 3.4 kg)

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11.17 Thermal Imaging Camera

	CATEGORY: **Energy Efficiency**
	MANUFACTURER: **FLIR**
	MODEL: **E-40 bx**
VENDOR PRODUCT PAGE: http://www.energyconservatory.com/products/flir-infrared-camera	
Comments: See product features video on above web site, or watch on YouTube: http://www.youtube.com/watch?feature=player_embedded&v=KPrqgFjqHTk Product brochure: http://www.energyconservatory.com/sites/default/files/documents/eseries.pdf	

Current Class Utilization	
Number:	Course Name
SST 110	Energy Auditing for Residential Buildings
NRG 112	Commercial Energy Use Analysis
NRG 121	Air Conditioning Systems Analysis

DESCRIPTION: Infrared cameras have been successfully used as a building diagnostic tool for over 20 years. From verifying insulation integrity to finding thermal bridges, there is no better tool for diagnosing hidden performance problems. And when combined with a Blower Door, an infrared camera can quickly expose air leakage sites that are buried deep inside ceiling, wall and floor assemblies.

The E-Series bx cameras have a visible light digital camera, WiFi connectivity to an iPad or iPhone, and voice and text annotation, adjustable picture in picture, digital zoom, ergonomic light-weight design, and superior temperature sensitivity.

FEATURES:

- Built-in laser locator.
- Built-in LED lamps and visible light camera provide great images in all lighting conditions
- Visible light camera resolution: 3.1 Megapixels).
- Picture in Picture - overlay visible and infrared images
- Wi-Fi connectivity to iPad or iPhone
- Voice and text annotation

ADDITIONAL CHARACTERISTICS:

- Long life Li-Ion battery assures uninterrupted inspections for over 4 hours on a single charge.
- Comes with carrying case and software (FLIR Tools) to help analyze images and create reports.
- Stores thousands of high quality infrared images (radiometric JPEG format) on a removable SD memory card.
- Easy-to-use temperature color alarms.
- Large high resolution color LCD display - 3 1/2"
- Rugged, ergonomic and lightweight design - 1.8 pounds
- Detector size: - 160 x 120
- Thermal sensitivity: <0.045 °C).

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11.18 Thermal Imaging Camera - Compact

	CATEGORY: **Energy Efficiency**
	MANUFACTURER: **FLIR**
	MODEL: **i7**
MANUFACTURER PRODUCT PAGE: http://www.flir.com/cs/emea/en/view/?id=41392	
Comments: See product features video on above web site, or watch on YouTube: http://www.youtube.com/watch?feature=player_embedded&v=KPrqgFjqHTk Product brochure: http://www.energyconservatory.com/sites/default/files/documents/eseries.pdf	

Current Class Utilization	
Number:	Course Name
SST 110	Energy Auditing for Residential Buildings
NRG 112	Commercial Energy Use Analysis
NRG 121	Air Conditioning Systems Analysis

DESCRIPTION: According to the manufacturer: FLIR i3/i5/i7 [series] is the smallest, lightest and most affordable thermal imaging camera on the market. It is incredibly easy to use and requires no former experience. It really is a matter of "point-shoot-detect" to obtain high-quality thermal images that will immediately give you the thermal information you need.

Features:

Outstanding ease-of-use
The camera is extremely easy to understand and operate, designed for entry-level users.

The camera is intuitive and comes with a full manual.

Fully automatic
Produces instant, point-and-shoot JPEG thermal imagery that carries all required temperature data and can be stored internally or externally, sent and analyzed.

Focus free
The fixed focus free lens makes using the FLIR i7 a snap.

Compact and lightweight
FLIR i7 weighs only 365 g, and is easy to store in a belt pouch

Extremely rugged
FLIR i-Series thermal imaging cameras withstand a 2 meter drop. They are water-splash proof and IP43 rated.

SD card storage
Stores images with unique ID in radiometric JPEG format, containing all temperature data on a standard mini SD card. USB file transfer to PC.

Reporting and analysis software included
FLIR Tools software is included and the camera is also compatible with the more powerful FLIR Reporter.

Outstanding measurement/accuracy
High accuracy of ±2°C or ±2% produces sensitive thermal images for general purpose maintenance analysis. Measures temperatures up to +250°C and detects temperature differences as small as 0.10°C.

Measurement functions
Spotmeter, box with max./min. temperatures, isotherm above/below (depending on model).

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11.19 Infrared Thermometer

	CATEGORY: **Energy Efficiency**
	MANUFACTURER: **Westward**
	MODEL: **1VR3**
VENDOR PRODUCT PAGE: http://www.professionalequipment.com/infrared-thermometer-58-to-1832-f-30-inch-focus-1ver3/infrared-thermometer/	
Comments:	

Current Class Utilization	
Number:	Course Name
SST 110	Energy Auditing for Residential Buildings
NRG 112	Commercial Energy Use Analysis
NRG 121	Air Conditioning Systems Analysis

DESCRIPTION: The IVR3 is an Infrared Thermometer, a handheld thermometer with laser sighting that enables one to take temperature measurements remotely.

Features:

- Temperature range of -58 to 1832 °F (-50 to 1000°C)
- Adjustable emissivity from 0.01 to 1.00
- Large LCDs
- Data hold
- Focus Spot Size and Distance 1 In @ 30 In
- Accuracy of +/-5°C (+/-3°C) from -58 to -4°F (-50 to -20°C); +/-3°F (+/-2°C) from -4 to 212°F (-20 to 100°C); +/-2% from 212 to 1832°F (100 to 1000°C)
- 500 ms response time
- Laser sighting

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11.20 Infrared Thermometer - Mini

	CATEGORY: **Energy Efficiency**
	MANUFACTURER: **General**
	MODEL: **IRT105**
VENDOR PRODUCT PAGE: http://www.generaltools.com/IRT105--61-POCKET-INFRARED-THERMOMETER_p_637.html	
Comments:	

Current Class Utilization	
Number:	Course Name
SST 110	Energy Auditing for Residential Buildings

DESCRIPTION: The IRT105 Pocket Infrared Thermometer is ideal for spot-checking the temperature of substances and surfaces from a distance.

- Dimensions: 4.25 x 2.05 x 0.98 in.
- Weight: 1.41 oz.

Features:

- 6:1 Distance-to-spot ratio
- Accuracy of ~3øF or 2% of reading above 32øF
- Fast response time
- Max/Min measurement and measurement lock modes
- Selectable øF or øC units
- Large LCD
- Separate batteries for thermometer and laser
- Small and light and easy to use

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11.21 Laser Distance Meter

<table>
<tr><td>
</td><td>CATEGORY:
Energy Efficiency</td></tr>
<tr><td rowspan="2"></td><td>MANUFACTURER:
Leica</td></tr>
<tr><td>MODEL:
DISTO D2
 </td></tr>
<tr><td colspan="2">VENDOR PRODUCT PAGE:
http://www.leica-geosystems.us/en/Leica-DISTO-D2_69656.htm</td></tr>
<tr><td colspan="2">Video: http://www.youtube.com/watch?v=4vfp8GeEooY</td></tr>
</table>

Current Class Utilization	
Number:	Course Name
SST 110	Energy Auditing for Residential Buildings
NRG 112	Commercial Energy Use Analysis
NRG 121	Air Conditioning Systems Analysis

DESCRIPTION: "Leica DISTO™ D2 the smallest laser distance meter in the world" (see video referenced above).

Measure distances at the touch of a button and calculate areas or volumes. The compact and handy base model was specifically designed for indoor applications. Shortcut keys for addition, subtraction, area and volume calculation make measuring fast and very reliable. The last 10 measurements are also stored. As with all Leica laser distance meters, the laser dot is clearly visible. You can always see your targeting point, even if the target object is in a hard to access area

11.22 Pumps Training System

	CATEGORY: **Energy Efficiency** MANUFACTURER: **Lab Volt** MODEL: **46106**
MANUFACTURER PRODUCT PAGE: http://www.labvolt.com/products/industrial-maintenance/pumps/pumps-training-system-46106	
Comments:	

Current Class Utilization	
Number	Course Name:
NRG 112	Commercial Energy Use Analysis
NRG 121	Air Conditioning Systems Analysis

DESCRIPTION: With Lab-Volt's Pump Training System, students learn how to start up, operate, and troubleshoot industrial pumps in different configurations.

Maintenance is an essential part of the manufacturing process and requires specific skills. To help acquire these skills, the Lab-Volt Pumps Training System, Model 46106 familiarizes students with maintenance tasks such as pump installation, lubrication, shafts alignment, inspection, and component replacement.

Through hands-on activities, students discover the impact of valve restriction, air injection, and NPSH on pumps efficiency by using a cavitation valve, a load valve, and two different water reservoirs.

To vary the speed of the motor-driven pumps, the latest 3-phase AC drive is included with the trainer. Easy electrical connections between the drive and the motor can be achieved using the banana jacks on the front panel.

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If wiring skills must be acquired, terminal blocks are also provided for a more realistic wiring method. The control and configuration of the drive can be accomplished directly on the drive itself or by using computer software (optional).

The accompanying Lab-Volt courseware correlates to the maintenance objectives to maximize educational efficiency.

Topics Covered

Industrial Pumps
- Characteristics of different industrial pumps
- Fluid mechanics and pump operating principles
- Parallel and series pump configuration

Installation
- Pump shaft installation and mounting
- Wire pumps and drives using banana jacks or terminal blocks
- Configure variable speed drives
- Create a serial network between drives

Performance
- Effect of restriction, tubing size, air and medium type on flow, pressure, and power consumption
- Impact of tank position on pump performance
- Analyze data from digital flow meters, digital pressure gauges, and drives display

Inspection
- Check parameters such as temperature, vibration, oil level, noise, and seal leakage
- Verify system operation

Troubleshooting
- Diagnostics regarding abnormal operating conditions

Maintenance
- Mechanical seal, diaphragm, valve, and packing replacement
- Pump-specific maintenance tasks

MANUALS / SOFTWARE:

Pemberton Campus Library –

- Pumps training system quick reference.[Reserve]

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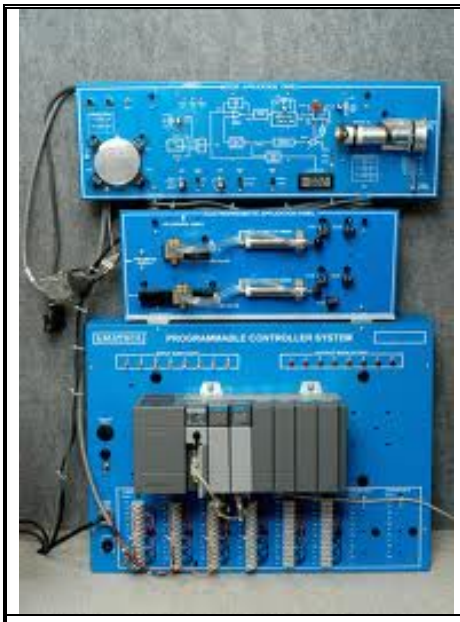
11.23 Programmable Controller Learning System



CATEGORY:
Energy Efficiency

MANUFACTURER:
Amatrol

MODEL:
85-P-AB502

MANUFACTURER PRODUCT PAGE:
http://www.amatrol.com/85-p-ab502/

Comments: Purchased accessories include models 17200 Pneumatic Application Panel and 17205 Motor Application Panel.

Current Class Utilization	
Number	Course Name:
NRG 241	Energy Applications of Programmable Logic Controllers
NRG 121	Air Conditioning Systems Analysis

DESCRIPTION: The model 85-P-AB502 Programmable Controller Learning System teaches Allen-Bradley SLC500 model programmable logic controllers used in industrial, commercial, and residential applications. Students learn industry-relevant skills including how to program, operate, install, and interface SLC500 programmable controllers for various applications.

The model 85-P-AB502 includes a bench top-mount workstation console, Allen-Bradley SLC5/02 model programmable controller with 16 24VDC discrete inputs and 16 24VDC discrete outputs, I/O simulator unit, 24VDC power supply, external I/O interface unit, student learning materials for both theory and lab, and teacher's guide.

The workstation's design enables students to extend their learning beyond simulation with an External Interface Unit that provides plug-in connections to real world applications. The External Interface Unit features built-in terminal strips with the ability to connect to I/O via individual

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lead jacks or groups of I/O via a mating plug-in terminal strip. This unique feature enables students to easily and quickly connect to other learning systems, student projects, and entire machines.

Learning Topics

- SystemDesign
- Interfacing to I/O Devices
- Contact and Coil Instructions
- Motor Control Applications
- Electro-Pneumatic Applications
- Timer/Counter Instructions
- Interpreting Programs
- PLC Ladder Logic Programming
- PLC Operation

MANUALS / SOFTWARE:

- Computer control 1 learning activity packet 3 : PLC motor control / Amatrol[Reserve]
- Equipment manual for 17200 electro-pneumatic application panel / Amatrol.
- Equipment manual for 17205 motors application panel / Amatrol.
- Mastering programmable controllers Allen-Bradley SLC500 : portfolio / assessment package / Amatrol.
- Mastering programmable controllers Allen-Bradley SLC500 : portfolio / assessment package / Amatrol.
- Mastering programmable controllers learning activity packet 1 : introduction to programmable controllers Allen-Bradley SLC 500 / Amatrol, Inc.
- Mastering programmable controllers learning activity packet 2 : basic PLC programming Allen-Bradley SLC 500 / Amatrol.
- Mastering programmable controllers learning activity packet 4 : discrete I/O interfacing Allen-Bradley SLC 500 / Amatrol.
- Mastering programmable controllers learning activity packet 5 : event sequencing Allen-Bradley SLC 500 / Amatrol.
- Mastering programmable controllers learning activity packet 6 : application development Allen-Bradley SLC 500 / Amatrol.

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- Mastering programmable controllers learning activity packet 7 : PLC timer instructions Allen-Bradley SLC 500 / Amatrol.

- Mastering programmable controllers learning activity packet 8 : PLC counter instructions Allen-Bradley SLC 500 / Amatrol.

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11.24 3-Phase Power Quality Analyzer

	CATEGORY: **Energy Efficiency**
	MANUFACTURER: **AEMC**
	MODEL: **3945-B with 36" AmpFlex® 193-36**
MANUFACTURER PRODUCT PAGE: http://www.aemc.com/products	
Comments:	

Current Class Utilization	
Number	Course Name:
NRG 112	Commercial Energy Use Analysis

DESCRIPTION: The PowerPad® Model 3945-B is a hand-held three-phase power and power quality meter with a large easy-to-read graphical color display. Measurements are displayed numerically and graphically with colored waveforms. The meter is menu driven with pop-up functions that are activated at the push of a button. All necessary measurements are available for a comprehensive power system check or analysis.
The PowerPad® Model 3945-B with AmpFlex® 193-36 is supplied with a set of three 36" color-coded 6500A flexible current probes.

The PowerPad® has logging, transient capture and event capture functions, an optical RS-232 and advanced software (DataView®), which can pilot the PowerPad® and provide comprehensive reports.

Features

- PowerPad® Model 3945-B with 36" AmpFlex® 193-36 Flexible Current Probes
- True RMS single-, two- and three-phase measurements at 256 samples/cycle plus DC
- Real-time color waveforms
- Easy-to-use on-screen setup
- True RMS voltage and current measurements
- Measures DC volts, amps and power
- Display and capture voltage, current and harmonics to the 50th order
- Phasor Diagram Display
- VA, VAR and W per phase and total
- KVAh, VARh and kWh
- Neutral current display for three-phase
- Transformer K-factor display
- Power Factor displacement PF display
- Captures up to 50 transients
- Short-term flicker display
- Phase unbalance (current and voltage)
- Harmonic Distortion (total and individual)

Applications

- Verification of power distribution circuits
- Measurement and recording of power system quality (kW, VA, VAR)
- Energy metering (kVAh, VARh, kWh)
- In plant troubleshooting of power distribution panels and individual machinery
- Monitor pad mount transformers
- Determine harmonic problems originating from source or load
- Monitor phase balances
- Determine transformer K-factor
- And much, much more

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11.25 Heat Exchanger System

WL 110 Heat Exchanger Service Unit

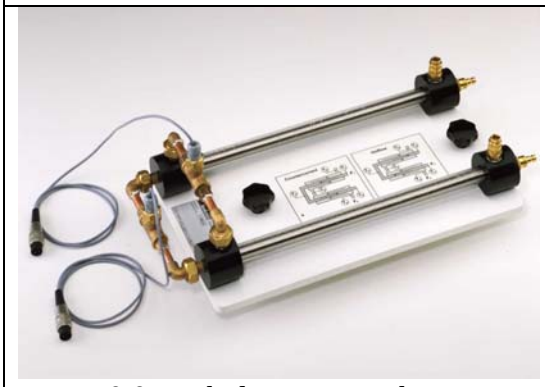
CATEGORY:
Energy Efficiency

MANUFACTURER:
US Didactic

MODEL:
WL 110 and Accessories

MANUFACTURER PRODUCT PAGE:
http://www.usdidactic.com/html/p3434.htm#

Comments: System Components
WL 110 -- Heat Exchanger Service Unit
WL 110.01 -- Tubular Heat Exchanger
WL 110.02 -- Plate Heat Exchanger
WL 110.05 -- Data Acquisition System



WL 110.01 Tubular Heat Exchanger

WL 110.02 Plate Heat Exchanger

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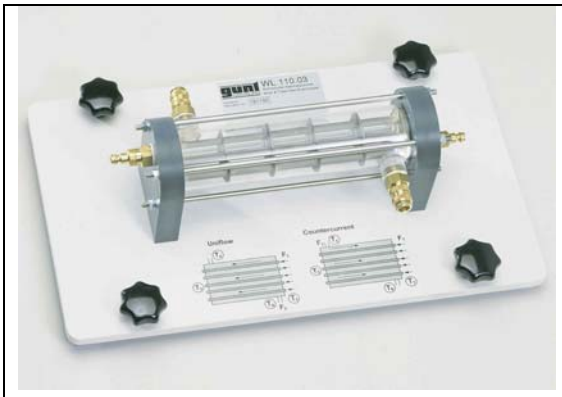
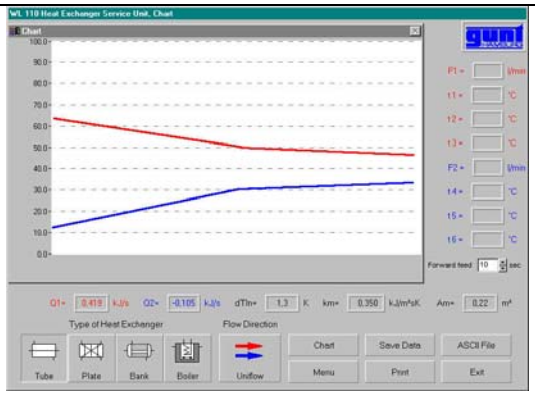


WL 110.3 Shell & Tube Heat Exchanger



WL 110.05 Data Acquisition System

Current Class Utilization	
Number	Course Name:
NRG 112	Commercial Energy Use Analysis
NRG 121	Air Conditioning Systems Analysis

DESCRIPTION: Using this benchtop unit the complex area of convective heat transfer can be investigated experimentally. Different heat exchanger modules (accessories) can be easily connected to the service unit, which includes a hot water tank with electrical heater and pump. The hot water temperature and the cold and hot water flow rates can be adjusted. The relevant temperatures and flow rates are measured using sensors and indicated on digital displays. It is possible to process the measured values on a PC using the data acquisition card and software (WL 110.05). A supply of cold water (mains or WL 110.20) is required.

Learning Objectives

- Function and operating performance of heat exchangers:
    + Tubular Heat Exchanger (WL 110.01)
    + Plate Heat Exchanger (WL 110.02)
    + Shell and Tube Heat Exchanger (WL 110.03)
- Temperature curves in parallel flow operation
- Temperature curves in counter-flow operation
- Comparison of different types of heat exchangers

Tubular Heat Exchanger

The heat exchanger is connected to the service unit WL 110 using quick-action hose couplings and secured with star grip screws. The temperature sensors for measuring the feed and return temperature are on the supply connections on the WL 110. The tubular heat exchanger includes 2 additional temperature sensors for measuring the mean temperature. Connections for these additional temperature measuring points are provided on the service unit.

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Plate Heat Exchanger

The plate heat exchanger features high performance in a small package and is often used in practice. This plate heat exchanger has 6 plates. It is connected to the WL 110 Service Unit using quick-action hose couplings and secured with star grip screws. The temperature sensors for measuring the feed and return temperature are on the supply connections on the WL 110.

Shell & Tube heat Exchanger

The heat exchanger is connected to the WL 110 service unit using quick-action hose couplings and secured with star grip screws. The temperature sensors for measuring the feed and return temperature are on the supply connections on the WL 110. The shell of the heat exchanger is made of transparent plastic so that the tubes are fully visible. Shell and tube heat exchangers are typical industrial heat exchangers and are manufactured up to very large sizes.

Data Acquisition System

The PC-data acquisition system for the heat exchanger experiments with WL 110 consists of a powerful dataacquisition card with specially matched software. Measured data can be displayed online on a PC. The various types of heat exchanger can be selected via icons, regardless of whether the heat exchangers are operated in parallel flow or counter flow operation. Temperature curves are shown on an x-y diagram, while derived values such as heat trasferred to and from a flow are calculated and shown. The packet also offers the storage and printing of data. The data system allows for:

- Printout of temperature curves in diagrams
- Display of measured values and derived variables
- Storage and printout of measured values

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11.26 Lighting Display - Commercial

CATEGORY:
Energy Efficiency

MANUFACTURER
The Energy Team

Above - Switching Panel with Power Meter

MANUFACTURER PRODUCT PAGE:

Comments:

Current Class Utilization	
Number	Course Name:
NRG 131	Lighting Fundamentals
NRG 132	Lighting Applications
SST 110	Energy Auditing for Residential Buildings

DESCRIPTION: Board-mounted commercial lighting display with power meter. The relative energy efficiency of different lighting selections can be readily demonstrated. Lighting fixtures are connected to a power consumption measurement meter via a push-button control panel. This allows easy switching between different lighting configurations and an immediate meter display of power use. The display board contains:

- Low efficiency lighting fixtures – indoor and outdoor
- High efficiency lighting fixtures – indoor and outdoor
- Very high efficiency lighting fixtures – indoor and outdoor
- Power consumption measurement meter

11.27 Lighting Display Cases – Residential & Commercial

CATEGORY:
Energy Efficiency

MANUFACTURER:
The Energy Team LLC

MODEL:

MANUFACTURER PRODUCT PAGE:

Comments:

LED Lighting Case

Current Class Utilization

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Number	Course Name:
NRG 131	Lighting Fundamentals
NRG 132	Lighting Applications
SST 110	Energy Auditing for Residential Buildings

DESCRIPTION: These portable commercial/residential lighting displays are used to demonstrate a variety of lighting options. Each comes in a rugged "suitcase style" carrying case containing:

- Power cord (120 V AC)
- Various lighting sources ("light bulbs")
- Mixture of bases
- Built-in wattage meter

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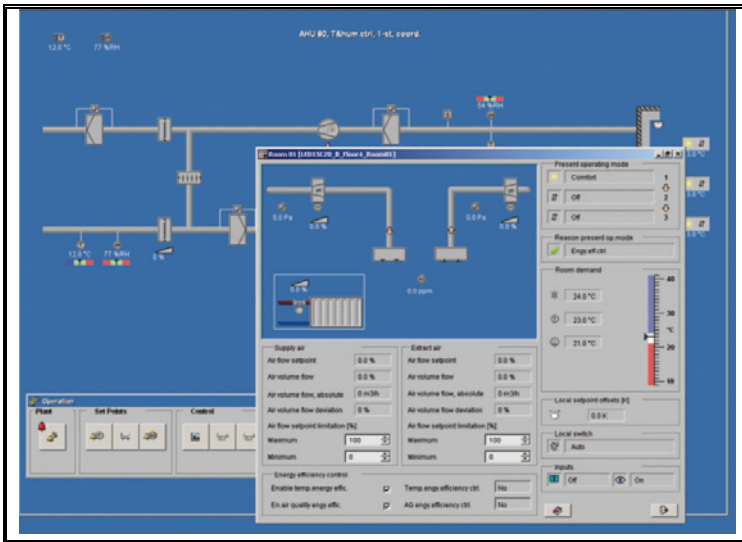
11.28 Building Automation System Software

	CATEGORY: **Energy Efficiency**
	MANUFACTURER **Siemens Industry, Inc.**
	Model Insight APOGEE Client software package
MANUFACTURER PRODUCT PAGE: http://w3.usa.siemens.com/buildingtechnologies/us/en/building-automation-and-energy-management/apogee/pages/apogee.aspx	
Comments: Installed in Parker Center, Room 116K.	

Current Class Utilization	
Number	Course Name:
NRG 121	Air Conditioning Systems Analysis
NRG 112	Commercial Energy Use Analysis
NRG 121	Air Conditioning Systems Analysis
NRG 124	Energy Efficiency Methods

DESCRIPTION: Read-only software provides students a real-time view into the temperatures, flows, set-points, etc. of the existing Siemens Building Automation System (BAS) software that is used to monitor and control HVAC systems on the four BCC campuses.

Classroom viewing utilizes a 70” flat panel display.

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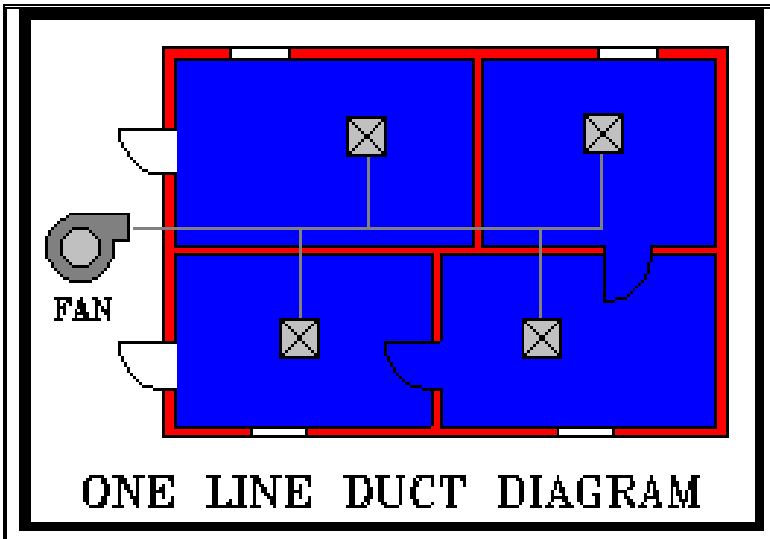
11.29 Building HVAC Design Software



CATEGORY:
Energy Efficiency

MANUFACTURER
Elite Software

Model

MANUFACTURER PRODUCT PAGE:
http://www.elitesoft.com/

Comments: Installed in course instructors' loaner laptop computers, and in labeled student computers, in the Programmable Logic Controllers lab, Lewis Parker Center, Room 116K. Original software CD is maintained by OIT. Software manuals maintained by Pemberton Campus Library.

Current Class Utilization	
Number	Course Name:
NRG 112	Commercial energy Use Analysis
NRG 121	Air Conditioning Systems Analysis
NRG 124	Energy Efficiency Methods
SST 221	Geothermal HVAC Systems

DESCRIPTION: Elite Software is a software developer for HVAC, electrical, plumbing, and fire protection design software. Over 30 programs are offered for such applications as HVAC load calculations, building energy analysis, HVAC duct and pipe sizing, plumbing & lighting design, fault current calculations, voltage drops, fuse and breaker coordination, and much more.

LIST OF SOFTWARE:

- Rhvac - Residential HVAC Loads and Duct Sizes
- Chvac - Commercial HVAC Loads
- H-Sym - Chilled and Hot Water Pipe Analysis
- Ductsize - HVAC Duct Sizing and Analysis
- Drawing Board - Drawings Linked to HVAC Calcs (and embedded in each program)

Rhvac - Residential HVAC Loads and Duct Sizes

Rhvac quickly and accurately calculates peak heating and cooling loads for residential and small commercial buildings in accordance with the eighth edition of the ACCA Manual J. The Heat Transfer Multipliers (HTM values) for all the walls, windows, doors, and roofs listed in Manual J are stored and automatically looked up by the program as needed. Other features include exterior glass shading, ventilation air, miscellaneous latent loads, default room data, automatic rotation of the entire building, hydronic heat calculations and much more

.

Chvac - Commercial HVAC Loads

Chvac quickly and accurately calculates the maximum heating and cooling loads for commercial buildings. Chvac automatically looks up all cooling load and correction factors necessary for computing loads. In addition, it can look up outdoor design weather data for over 2000 cities located around the world. Comprehensive reports list the general project data, detailed room loads, air handler summary loads, outside air loads, total building loads, building envelope analysis, tonnage requirements, CFM air quantities, chilled water flow rates (if applicable), and complete psychrometric data with entering and leaving coil conditions. Other features include ASHRAE Standard 62 analysis, automatic building rotation, 360 degree wall orientations, tilted glass, exterior shading, internal operating load profiles, variable indoor design temperatures, people diversity, pretreated outside air, seasonal infiltration and ventilation rates, reheat loads, duct gains and losses, and return air plenums.

H-Sym - Chilled and Hot Water Pipe Analysis

The Elite Software H-Sym program analyzes centralized HVAC piping systems that use chilled and/or hot water. In the simulation of HVAC water piping systems, H-Sym can determine pressure losses, actual operating pressures, temperatures of air and water, flow rates, and obtainable unit loads throughout the system. Complex systems containing all types and sizes of pipe, insulation, boilers, chillers, pumps, coils, heat exchangers, two and three way control valves, water temperature control valves, radiators, and insulation can be defined. Pipes can be entered with sizes or H-Sym can size them for you. H-Sym provides a cost effective way to obtain a steady state analysis of an existing or a proposed system. With H-Sym a designer can investigate a myriad of design alternatives in search of an optimal design that provides low cost and reliable performance.

Ductsize - HVAC Duct Sizing and Analysis (demo version, but still has many useful capabilities)

Ductsize quickly calculates optimal duct sizes using the static regain, equal friction, or constant velocity method. Duct sizes can be calculated on a round, rectangular, and flat oval basis. Noise levels and required attenuation are printed for each runout duct. A library of fan data for noise calculations is built into the program. Ductsize also has an option for specifying duct height and width constraints to control sizes. This feature is also useful for analyzing problems in existing systems where the duct sizes are already specified.

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Drawing Board - Drawings Linked to HVAC Calcs

Drawing Board is a fast and simple program for drawing floor plans and ductwork. Drawings can be quickly created by dragging and dropping drawing objects from the built-in object catalogs onto the drawing window. The drawing objects in Drawing Board are pre-programmed shapes such as entire room shapes, walls, doors, windows, and ductwork. These are intelligent objects that contain data useful for the Chvac, Rhvac and Ductsize programs. A basic use of Drawing Board is to create floor plans so that hvac load calculations can be performed from the plans with Rhvac and Chvac. Duct work can be drawn and manually sized using Rhvac and Drawing Board, or automatically sized by using Ductsize.

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11.30 Equipment Trailer – Building Energy Efficiency

CATEGORY:
Energy Efficiency

MANUFACTURER
Hecht Trailer Inc.

Model
11D81197HMK
5xSHLC

MANUFACTURER PRODUCT PAGE:
http://www.gohechtshop.com/trailers-for-sale/

Comments:

Current Class Utilization	
Number	Course Name:
SST 110	Energy Auditing for Residential Buildings
Corporate College	Energy Auditing Career Development Courses

DESCRIPTION: This trailer is specifically modified to transport tools, test equipment, and supplies related to building energy auditing. It is equipped with 4 floor-mounted, lockable tool boxes as well an external door padlock. It is used to securely transport energy auditing materials between campuses, for example from Pemberton to the College's residential Energy Efficiency Trainer at 120 Harford Road, Mt. Laurel. Potential future uses include transport of equipment for performance of home energy audits within the local community.

11.31 Residential Energy Efficiency Trainer

CATEGORY:
Energy Efficiency

Comments: This Energy Efficiency Trainer is a BCC property at 120 Hartford Road, bordering the Mt. Laurel campus..

Current Class Utilization	
Number	Course Name:
SST 110	Energy Auditing for Residential Buildings
Corporate College	Energy Auditing Career Development Courses

DESCRIPTION: This full-size house has been dedicated for use as the capstone training and student evaluation venue for knowledge and skills learned in the residential energy auditing curriculum. All necessary tools for a realistic home energy auditing assessment may be transported to the site using the Building Energy Efficiency Equipment Trailer (Catalog item 11.16).

11.32 Airborne Particulate Monitor

Removable cover
Door for monitoring with closed cover (not visible in photo)
Interchangeable size-selective impactor (PM10, PM2.5, PM1.0, or TSP)
Accessible sensor compartment with clean air purging
Temperature-compensated electronics with datalogging
Large, easy-to-read display
Rugged watertight carry case
Particulate Air Monitoring Equipment
HAZ-DUST
Handy tool pouch
24-hour rechargeable battery with status indicator
Easy 4-key operation
Internal audible alarm
CE

CATEGORY:
Environmental – Air Quality

MANUFACTURER
SKC

Model
HAZ-DUST EPAM-5000

MANUFACTURER PRODUCT PAGE:
http://www.skcinc.com/prod/770-203.asp

Comments:

Current Class Utilization	
Number	Course Name:
NRG 121	Air Conditioning Systems Analysis

DESCRIPTION: The portable HAZ-DUST EPAM-5000 particulate monitor is ideal for ambient, environmental, and indoor air quality investigations. The highly sensitive EPAM-5000 uses light scattering to measure particle concentration, and provide real-time determinations and data recordings of airborne particle concentration in mg/m^3.

Interchangeable size-selective sampling heads allow PM10, PM2.5, PM1.0, or TSP monitoring. The unique aerodynamic particle sizing and optional 47-mm in-line filter holder loaded with appropriate filter can provide concurrent gravimetric sampling. Download and store sampling data on a PC for analysis and reporting using included DustComm Pro Software.

- Highly sensitive and accurate
  - 0.001 to 20.0 mg/m^3 for particles 0.1 to 100 µm
  - Accuracy is ± 10% to NIOSH Method 0500 using SAE fine test dust
- Internal air sample pump for 4.0 L/min flows*

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- Unique aerodynamic particle-sizing real-time sensor
    - Use optional EPA FRM-style filter holder for gravimetric reference
- High correlation to EPA PM10 methods and TEOM®
    - Ideal for saturation sampling
- Up to 24-hour operation on one battery charge
    - Continuous monitoring with AC adapter
- Immediate display and data storage
- Audible alarm siren
- Easy-to-use DustComm Pro data analysis and reporting software included
- Portable and compact
    - 6 x 14 x 10 inches (15.2 x 35.6 x 25.4 cm)
    - 12 pounds (5.4 kg)
- Interchangeable size-selective sampling heads for EPA parameters
    - PM10, PM2.5, PM1.0, and TSP

EPAM 5000 Features

- User-programmable start and stop time for unattended data collection
- On-screen user-selectable sampling parameters retained in memory for quick, easy deployment when sampling parameters remain unchanged
- Wireless data transmission option transmits data up to 5 miles
- Improved DustComm Pro PC Software provides:
    - Greater flexibility in graphical reports — create and label in new "draw and paint" program
    - Basic trend analysis
    - Live data feed and logging from wireless data transmission
- Interfaces with the VDM-7500 wireless video exposure dust monitoring system

EPAM-5000 Applications

- Quantifying off-site particulate migration
- Surveying for PM2.5 and PM10
- Monitoring dust generation during drilling and excavation
- Evaluating dust suppression and engineering controls
- Locating and identifying "hot spots"
- Emergency response and fugitive emissions compliance
- Determining level of respiratory protection
- Survey of workplace for OSHA/EPA compliance
- Evaluating worker exposure to airborne contaminants
- Dust collector/ventilation system checks
- Monitoring lung-damaging particles in factories and buildings
- Complementary instrument for all EPA and OSHA personal and ambient particulate air sampling procedures

Proprietary – Burlington County College use only

11.33 Volatile Organics Detector

CATEGORY:
Environmental – Air Quality

MANUFACTURER
SKC

Model
MiniRAE 3000 Deluxe Kit, datalogging (Catalog #730-B111-100)

MANUFACTURER PRODUCT PAGE:
http://www.skcinc.com/prod/730-B110-000.asp
http://www.skcshopping.com/ProductDetails.asp?ProductCode=730-B111-100

Comments:

Current Class Utilization	
Number	Course Name:
NRG 121	Air Conditioning Systems Analysis

DESCRIPTION: The MiniRAE 3000 photoionization detector (PID) measures total volatile organic compounds present with a range of 0 to 15,000 ppm. Suitable for applications from industrial hygiene to leak and HazMat detection.

Deluxe Kit comes with 10.6 eV lamp, internal pump, Li-Ion battery, charging/download adapter, tool kit, rubber boot, alkaline battery adapter, lamp cleaning kit, ProRAE Studio software, operation CDROM, soft leather carry case, accessories kit and calibration kit. NOTE: With Wireless (Bluetooth) Data Download. Available wireless technology allows real-time data transmissions with a base controller located up to 500 feet away from the monitor. A PC can be used as the base station.

Features:

- Patented sensor, proven PID technology
    - 3-second response time
    - Extended range with improved linearity
        - MiniRAE 3000: 0 to 15,000 ppm
    - Built-in humidity and temperature sensors
- Real-time wireless data transmission
- Built-in sample pump draws up to 100 feet (30 m) horizontally or vertically
- Easy no-tool lamp, sensor, and battery access
- Interchangeable Li-Ion and alkaline battery packs
- Integrated flashlight for dark conditions
- Large graphic display and user-friendly screens
- AutoRAE-compatible for automatic calibration
- Built-in correction factors for > 200 compounds
- Multi-language support
- Rugged IP-67 rated waterproof housing
    - Strong, protective, and removable rubber boot
- Datalog up to 6 months of data at 1-minute intervals
- 3-year 10.6 eV lamp warranty

Proprietary – Burlington County College use only

12 Agricultural Business Technology

12.1 Matterhorn Peaked Roof Rimol Greenhouse

	CATEGORY: **Greenhouse**
	MANUFACTURER: **Rimol Greenhouse Man.**
	MODEL: **Matterhorn, Peaked Roof Greenhouse**
MANUFACTURER PRODUCT PAGE: http://www.rimolgreenhouses.com/	
Comments: For more information on addition, please contact NASA staff.	

Current Class Utilization	
Number	Course Name
AGR 120	Greenhouse Management & Crop Protection

DESCRIPTION: *Matterhorn, Peaked Roof Greenhouse* from Rimol Greenhouse Systems, polycarbonate professional greenhouse kit, 30'W X 96' L. Exterior walls and roof consist of 8mm thick, clear triple-wall polycarbonate material. The integrity of the polycarbonate walls and roof will be maintained over a temperature range of -40 degrees to 250 degrees. Cooling/ventilation systems consisting of one 54" single ridge vent, two 48" side wall vents, and four 12" horizontal air flow fans. Heating equipment includes two 175,000 BTU natural gas fired, high efficiency forced air furnaces. Flame retardant screen installed for shading and cooling. Access in and out of the greenhouse is provided by two pre-hung insulated service doors. Includes 6' x 12' potting benches.

12.2 Constructable Greenhouse (8' 6" x 24' 10")

8.5’ x 16.7’ model shown

CATEGORY:
Sustainable Agriculture

MANUFACTURER
RION

Model
Green Giant

MANUFACTURER PRODUCT PAGE:
http://www.riongreenhousekit.com/riongreengiant-GG-24.php

Comments: 4 kits purchased

Current Class Utilization	
Number	Course Name:
AGR	To be determined

DESCRIPTION: The Rion Green Giant greenhouse features twin-wall 6mm translucent polycarbonate glazing panels that create superb insulation and protection for plants and flowers, and are designed for year-round use. Double doors allow for easy entry and exit and provide excellent ventilation when opened. The rich hunter green frame is thick and sturdy. The Dutch barn roof design is both elegant and functional with 8 ft. of headroom and 6'9" doors. The kits as purchased include a heavy-duty greenhouse base foundation, roof vents, side louver windows for cross ventilation, automatic roof window openers, and a second double door kit, providing both front and rear entry.

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12.3 Portable Greenhouse – Dome Design

CATEGORY: **Sustainable Agriculture**
MANUFACTURER **Outdora**
Model **The Dome House**
MANUFACTURER PRODUCT PAGE: http://www.outdora.com/13800fhdo800.html
Comments: 4 kits purchased

Current Class Utilization	
Number	Course Name:
AGR	To be determined

DESCRIPTION: This outdoor structure comes with a screened, zippered door and eight vents for easy cooling and heating. Its 10' height provides plenty of space for portable greenhouse shelving. No tools are needed to set up. When growing season is over, the portable greenhouse kit fits neatly into the included carrying case.

The 168" diameter geodesic dome is perfectly angled for maximum heat transmission and sits directly on the ground. The tough Gro-Tec woven polyethylene material is completely waterproof, UV-resistant and rip-resistant. Combined with the included tie-downs and stakes, the portable greenhouse can withstand 60 mph winds. The greenhouse comes with two portholes for hoses and power cord.

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12.4 *Portable Greenhouse – House Design*

CATEGORY:
Sustainable Agriculture

MANUFACTURER
Outdora

Model
The Farm House

MANUFACTURER PRODUCT PAGE:
http://www.outdora.com/13800fhfh700.html

Comments: 4 kits purchased

Current Class Utilization	
Number	Course Name:
AGR	To be determined

DESCRIPTION: Made from tough, woven polyethylene Gro-Tec, the completely waterproof and rip-resistant structure is designed to endure up to 60 mph winds. when secured with the included stakes and tie-downs. The clear material lets through 80% diffused light for ideal growing conditions. At just 60 pounds, this model is manageable to move..

This kit assembles without tools and packs down easily into the included carrying case. A zip-together design allows for instant expansion. Dimensions of 96" x 108" x 108" provide room for tall plants, a garden bench and other gardening supplies. Ventilation is achieved with a dozen vents and two screened and zippered doors. Four portholes are provided to pass through power cords and garden hoses, and a shade cover is included.

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12.5 Time-lapse Plant Camera

	CATEGORY: **Sustainable Agriculture** MANUFACTURER **Wingscapes** Model **WSCA04 PlantCam**
MANUFACTURER PRODUCT PAGE: http://www.wingscapes.com/timelapse-cameras/timelapse-plantcam	
Comments: 2 units available for use. Timelapse demo video on above website.	

Current Class Utilization	
Number	Course Name:
AGR	To be determined

DESCRIPTION: The Timelapse PlantCam is rugged and weatherproof, and automatically takes photos and videos at set time intervals. It then stitches the photos together to create a video showing in minutes or seconds what usually can't be seen with the naked eye. With 4.0 Megapixels, the Timelapse PlantCam takes crisp, clear still photos and video clips.

To create a timelapse movie, simply set the camera to take still photos at the desired time interval—immediately, 30 seconds, 1 minute, 5 minutes, 10 minutes, 15 minutes, 30 minutes, 1 hour, 3 hours, 6 hours, or once a day. It will automatically turn on after each interval countdown, take a photo, then return to battery conservation mode. After you are finished taking photos in timelapse mode, simply set the camera to "Convert to Movie".

The PlantCam doesn't require any special software for viewing photos. It can connect directly to a television or computer, or you can simply transfer from the optional memory card. Photos and videos download in standard formats for viewing, printing, e-mailing or posting online.

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12.6 Timelapse Camera – High Resolution

<table>
<tr><td>

Canon EOS Rebel T1i Digital SLR Camera</td><td>CATEGORY:
Sustainable Agriculture

MANUFACTURER
Canon

Model
Rebel T1i

Fotodiox Aperture Timer Remote Control Shutter Cable</td></tr>
<tr><td colspan="2">MANUFACTURER PRODUCT PAGE:
http://www.usa.canon.com/cusa/support/consumer/eos_slr_camera_systems/eos_digital_slr_cameras/eos_rebel_t1i</td></tr>
<tr><td colspan="2">Comments: Use of purchased Fotodiox intervalometer allows generation of timelapse video. 2 cameras and 2 intervalometers available for use.</td></tr>
</table>

Current Class Utilization	
Number	Course Name:
AGR	To be determined

DESCRIPTION: High resolution camera for stills, video, or (with remote aperture timer) timelapse movies. Full HD video capture at resolutions up to 1920 x 1080. An HDMI port allows for quick connections to high definition TVs and monitors for easy viewing of stills and video.

Features:

- New 15.1-megapixel CMOS sensor with DIGIC 4 Image Processor
- Includes Canon EF-S 18-55mm f/3.5-5.6 IS lens
- Full HD video capture at 1920 x 1080 resolution; HDMI output
- 3.0-inch Clear View LCD; Live View Function for stills (Quick, Live and Face Detection AF modes) and video

12.7 Camera Tripod

<table>
<tr><td rowspan="4"> </td><td>CATEGORY:
Sustainable Agriculture</td></tr>
<tr><td>MANUFACTURER
Polaroid</td></tr>
<tr><td>Model
72” ProPod

Tripod is for use with Windscapes PlantCam (left) or Canon Rebel Tli SLR camera (right)</td></tr>
<tr><td>PRODUCT PAGE:
http://www.amazon.com/Polaroid-Includes-Carrying-Additional-Camcorders/dp/B003LTB8GM</td></tr>
<tr><td colspan="2">Comments: 4 units available for use</td></tr>
</table>

Current Class Utilization	
Number	Course Name:
AGR	To be determined

DESCRIPTION: Heavy-duty versatile tripod for use with cameras.

Features:

- Industrial Grade Materials And Construction Provide Maximum Stability And Versatility In A Variety Of Situations Regardless Of Equipment <> Ergonomically Designed, Built In Carrying Handle plus No Sweat Foam Grips
- Exclusive Double Bubble Dual Bubble Levels <> Extends To A Full 6 Feet Yet Weighs 4 Pounds Yet Retracts To Just 28 Inches For Anytime / Anywhere Portability
- Locking Braced Center Column With Well <> Swivel Set Rubber Feet For Spike Like Traction & Stability Without Damaging Surfaces Convenient
- Multi Purpose Pan Head Ideal For Camcorders As Well <> Swivel Set Rubber Feet For Spike Like Traction & Stability Without Damaging Surfaces
- Three Section, Fully Adjustable Legs With Stay Set Auto Locking Mechanism For Fast And Easy Height Adjustments

12.8 Data Logging System – Energy and Weather

15 Channel Web-based Monitoring System

CATEGORY:
Sustainable Agriculture

MANUFACTURER
Onset

Model
HOBO U30 Cellular Data Logger - U30-GSM

PRODUCT PAGE:
http://www.onsetcomp.com/products/data-loggers/web-based-data-logging-systems

Comments:

Current Class Utilization	
Number	Course Name:
AGR	To be determined
NRG 112	Commercial Energy Use Analysis
NRG 124	Energy Efficiency Methods

DESCRIPTION: The HOBO U30-GSM is a web-based, 15-channel data logging system for a broad range of energy and weather monitoring applications. The system transmits data to the web via cellular communications for easy access from internet-enabled devices. In addition, alarms can be configured to generate text messages and emails when data goes out of range. The HOBO U30 contains 5 smart (digital) sensor ports and one generic analog port (for 3rd party sensor modules)

Features:

- Web-based data access via cellular communications
- Plug-and-play smart sensors enable rapid deployment
- Double weatherproof, tamperproof enclosure for harsh environments
- Alarm capabilities via text, e-mail
- Optional analog inputs with sensor excitation
- HOBOlink for viewing data and system configuration via the web
- Scheduled data delivery from HOBOlink to email or FTP
- Includes relay that can be activated on user-defined alarm conditions

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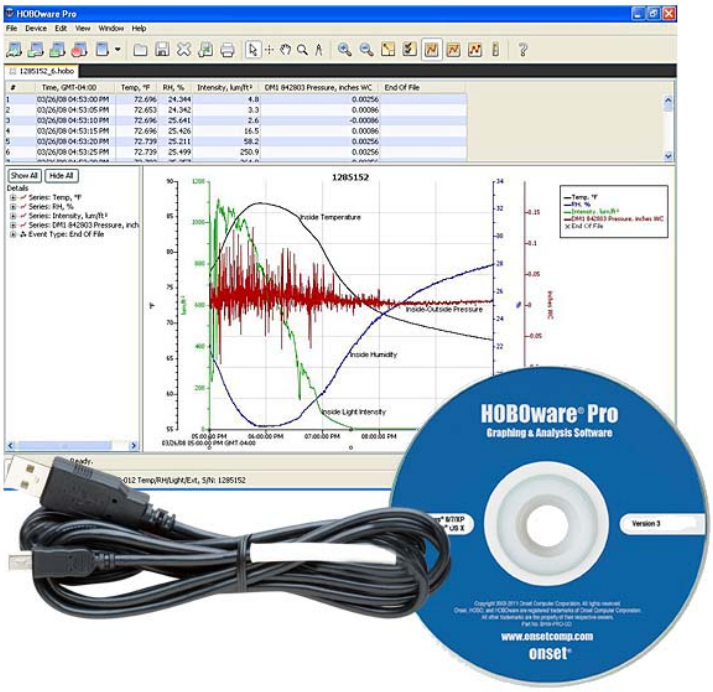
12.9 Data Logger Software



HOBOware Pro Mac/Win Data Logger Software - BHW-PRO-CD. For use with HOBO data logging system (right)

CATEGORY:
Sustainable Agriculture

MANUFACTURER
Onset

Model
S-LIA-M003

PRODUCT PAGE:
http://www.onsetcomp.com/products/software/bhw-pro-cd

Comments:

Current Class Utilization	
Number	Course Name:
AGR	To be determined
NRG 112	Commercial Energy Use Analysis
NRG 124	Energy Efficiency Methods

DESCRIPTION: Put your data to productive use with HOBOware® Pro software. Plot or export data to spreadsheets to conduct analysis necessary for your project. HOBOware® Pro is easy to set up and its intuitive, point-and-click interface makes it simple to run. This data logging application is compatible with all HOBO data loggers and wireless data nodes.

Features:

. Easy Logger Setup and Readout

- HOBOware Pro makes it fast and easy to set up HOBO data loggers for deployment, and to readout the loggers after data has been collected. Settings are configured using simple, intuitive windows.

- HOBOware also offers a number of time-saving options that allow you to launch and offload multiple data loggers quickly by bypassing a number of default setup actions. This is ideal for projects involving multiple deployments of the same logger type.

Powerful Graphing and Analysis Tools

- HOBOware Pro's powerful graphing and analysis tools allow you to plot, analyze and extract key information from multiple data loggers with a few simple clicks, and quickly create custom graphs to document your data.

- Data Assistants let you create new data series by combining data recorded by the logger with additional data that you enter before you display the plot.

- HOBOnode™ Manager software, a component of HOBOware Pro for use with HOBO ZW Series data nodes, lets you view real-time energy and environmental data, set alarm notifications, and get an at-a-glance view of your network with the Network Map feature.

Easy File Management

- HOBOware Pro allows for one-click exports to TXT, CSV for XLS file types for use in other programs. The Bulk Export Tool allows you to easily convert large numbers of HOBO files to streamline the export process.

Presentation-quality Graphics

- With HOBOware Pro, there is no need to rely on third-party presentation software to obtain high-quality graphs and charts for presentations and posters.

- Easily customize fonts and annotate your graphs with titles, legends, and labels to create high-quality, visual presentations of your data.

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12.10 Temperature/RH Monitoring

<table>
<tr><td>

12-bit Temperature/RH Smart Sensor (2m cable). For use with HOBO data logging system (photo on right)</td><td>CATEGORY:
Sustainable Agriculture

MANUFACTURER
Onset

Model
S-THB-M002
</td></tr>
<tr><td colspan="2">PRODUCT PAGE:
http://www.onsetcomp.com/products/sensors/s-thb-m002</td></tr>
<tr><td colspan="2">Comments:</td></tr>
</table>

Current Class Utilization	
Number	Course Name:
AGR	To be determined

DESCRIPTION: The 12-bit Temperature/RH Smart Sensor is designed to work with all Onset data loggers that accept Smart Sensors. All sensor parameters are stored inside the Smart Sensor, which automatically communicates configuration data information to the logger without any programming, calibration, or extensive user setup.

Environment:
The S-THB-M002 Sensor is for use in **Indoor and Outdoor** environments

Measurements:
The S-THB-M002 Sensor supports the following measurements:

Temperature, Relative Humidity

12.11 Temperature Monitoring

 12-Bit Temp Smart Sensor (2m cable) - S-TMB-M002. For use with HOBO data logging system (right)	CATEGORY: **Sustainable Agriculture** MANUFACTURER **Onset** Model **S-TMB-M002**
PRODUCT PAGE: http://www.onsetcomp.com/products/sensors/s-tmb-m002	
Comments:	

Current Class Utilization	
Number	Course Name:
AGR	To be determined

DESCRIPTION: The 12-bit Temperature Smart Sensor provides < ± 0.2° C total accuracy (< ±0.36° F) and resolution of < ± 0.03° C (< ±0.054° F) over the range of from 0° to 50° C (32° to 122° F). The full measurement range is -40° to 100° C (-40° to 212° F). A selectable measurement-averaging feature further improves accuracy. Reliable service is assured by a stainless steel sensor tip and robust cable rated for immersion in water up to 50° C for up to 1 year. This model has a cable length of 2m.

Environment:
The S-TMB-M002 Sensor is for use in **Indoor , Outdoor and Underwater**environments

Measurements:
The S-TMB-M002 Sensor supports the following measurements:

Temperature, Water Temp

12.12 Soil Moisture Monitoring

EC-5 Soil Moisture Smart Sensor - S-SMC-M005.
For use with HOBO data logging system (right)

CATEGORY:
Sustainable Agriculture

MANUFACTURER
Onset

Model
S-SMC-M005

PRODUCT PAGE:
http://www.onsetcomp.com/products/sensors/s-smc-m005

Comments:

Current Class Utilization	
Number	Course Name:
AGR	To be determined

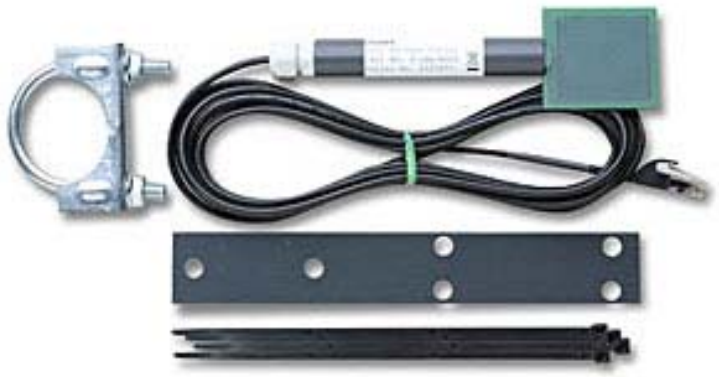
DESCRIPTION: This soil water content sensor offers a two-tine design for easy installation. In addition, the EC-5 is a smart sensor, which allows users to launch monitoring systems quickly, easily, and affordably. Since HOBO data loggers recognize this sensor, no complicated programming or setup is required. The EC-5 integrates with the field-proven ECH2O™ Sensor and a 12-bit A/D; and provides ±3% accuracy in typical soil conditions, and ±2% accuracy with soil-specific calibration. Readings are provided directly in volumetric water content. This sensor is designed to maintain low sensitivity to salinity and textural effects.

- Measures a 0.3 liter volume of soil
- Sensor uses a high-frequency (70 MHz) circuit that provides good accuracy even in high-salinity and sandy soils.
- Compatible with Onset standalone and web-based weather stations

Environment:
The S-SMC-M005 Sensor is for use in **Outdoor** environments

Measurements:
Soil Moisture

12.13 Leaf Wetness Monitoring

<table>
<tr><td> 
Leaf Wetness Smart Sensor - S-LWA-M003
For use with HOBO data logging system (right)</td><td>CATEGORY:
Sustainable Agriculture

MANUFACTURER
Onset

Model
S-LWA-M003
 </td></tr>
<tr><td colspan="2">PRODUCT PAGE:
http://www.onsetcomp.com/products/sensors/s-lwa-m003</td></tr>
<tr><td colspan="2">Comments:</td></tr>
</table>

Current Class Utilization	
Number	Course Name:
AGR	To be determined

DESCRIPTION: The Leaf Wetness Smart Sensor provides accurate leaf wetness data in a number of growing and research applications. The sensor is ready to use and does not require any painting or coating. It uses a capacitive grid that is less sensitive to surface residues than resistive grid-based sensors, and comes preconditioned for consistent measurements between sensors and for long-term stability. Along with a 3-meter cable, a mounting bracket is included so the sensor can be easily positioned to mimic the wet-dry characteristics of the plants being studied.

Environment:
The S-LWA-M003 Sensor is for use in **Outdoor** environments

Measurements:
The S-LWA-M003 Sensor supports the following measurements:

Leaf Wetness

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12.14 Photosynthetic Light Monitoring

 Photosynthetic Light (PAR) Smart Sensor. For use with HOBO data logging system (right)	CATEGORY: **Sustainable Agriculture** MANUFACTURER **Onset** Model S-LIA-M003
PRODUCT PAGE: http://www.onsetcomp.com/products/sensors/s-lia-m003	
Comments:	

Current Class Utilization	
Number	Course Name:
AGR	To be determined

DESCRIPTION: The Photosynthetic Light (PAR) Smart Sensor is intended to measure light intensity for the frequencies relevant for photosynthesis. This sensor has a measurement range of 0 to 2500 umol/m2/sec over wavelengths from 400 to 700 nm. Enclosed in a anodized aluminum housing with acrylic diffuser and o-ring seal, this model has a 3m cable; a light sensor bracket and light sensor level are recommended.

Environment:
The S-LIA-M003 Sensor is for use in **Outdoor** environments

Measurements:
The S-LIA-M003 Sensor supports the following measurements:

Light Intensity

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12.15 Composting System - Food Waste

Hopper, Transfer Auger, and Composter

CATEGORY:
Energy Efficiency

MANUFACTURER
Organic Resources Co.

Model 306

Composter and protective cage

MANUFACTURER PRODUCT PAGE:

Comments:

Current Class Utilization	
Number	Course Name:
SST 231	Introduction to Biomass and Biofuels Technology
AGR	To be determined

DESCRIPTION: **Rotating drum aerobic composter** with output capacity of approximately 1/3 cubic yard per day.

Unit includes protective cage for operator safety. The drum has 1" exterior insulation to help maintain proper composting temperature, and a 1500 Watt heater for use when needed in cold temperatures. The drum (with a corrosion-free interior rubber coating) has a timer for automatic rotation intervals. Feeding of material to the composter is accomplished via a screw auger with feed hopper equipped with a protective grating. A separate macerator unit is used as appropriate to grind food waster prior to introduction into the hopper/screw auger.

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BURLINGTON COUNTY COLLEGE
We Can Get You There.

Equipment Request Form

(Shaded areas below to be completed by Requestor)

Request Date:

Requestor:

Purpose of Request:

Project / Class / Event:

Date Required:

Date Returned:

Category	Manufacturer	Model	Description

Areas below to be completed by SMT Asset Management:

Approvals:

☐ **Dean** _____

☐ **Administrative** _____

☐ **Professor** _____

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